ORIGINAL RESEARCH PAPER

Volume-7 | Issue-3 | March-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# STUDY OF ENVIRONMENTAL RISK FACTORS FOR ACUTE LOWER RESPIRATORY TRACT INFECTIONS (ALRI) IN CHILDREN.

Pediatrics

**Dr Priyanka Shukla** Senior Resident, Department of Neonatology,AIIMS,Bhopal (M.P.)

**Dr Priya Gogia*** Senior Resident, Department of Pediatrics, AIIMS, Bhopal (M.P.) *Corresponding Author

## ABSTRACT

**Introduction-**Acute lower respiratory tract infection (ALRI) is a leading cause of mortality in children below 5 years of age. The International Consultation on Control of Acute Respiratory Infections, December 1991 reported links between environmental risk factors (passive smoking and overcrowding) and risk of ALRI. This study highlights the various environmental risk factors for ALRI in children.

**METHOD-** An observational case control study conducted in Tertiary care centre in metropolitan city during the two year period (Jan 2013-June 2014). A total of 150 children of age 2 months to 14 years admitted with clinical diagnosis of ALRI were taken as cases and 150 children of same age group who did not have ALRI as controls.

**Results and conclusions-** Environmental factors statistically significant and linked to higher incidence of ALRI were overcrowding (81.3%), liquid/solid cooking fuel medium( 42.7%) and exposure to passive smoking(65.3%). Data suggests that the majority of respiratory infections in children are preventable or treatable.

## KEYWORDS

## INTRODUCTION

Acute lower respiratory tract infection (ALRI) is a leading cause of mortality and one of the common causes of morbidity in children below 5 years of age.[1]

In developing countries 30% of all patients' consultation and 25% of all paediatric admission are of ARI[2]. Most infections are limited to the upper respiratory tract and 5% involve the lower respiratory tract. ALRIs are mostly caused by both viruses and bacteria. Viral agents account for 90% of upper respiratory tract infection (URIs) while bacterial pulmonary infections are common in developing countries associated with a greater risk of death[3]. Viral and bacterial infections occur concomitantly very frequently. Some associated infections include: common cold, acute otitis media, acute sinusitis, Pertussis, bronchiolitis and pneumonia.[4]

The International Consultation on Control of Acute Respiratory Infections, December 1991 reported that there are links between environmental risk factors (such as smoke, outdoor air pollution, indoor pollution, passive smoking, overcrowding) and ALRI.

Recent estimates from UNICEF show that pneumonia continues to be the number one killer of children around the world, causing 18% of all child mortality, an estimated 1.3 million child deaths in 2011 alone.[5] 50% of World's pneumonia deaths occur in India which means approximately 3.7 lakh children die of pneumonia annually in India[6].Recent surveys (2006-2013) indicate that, worldwide, 59% of children under-five with symptoms of pneumonia are taken to an appropriate provider; in low-income countries, this coverage is 49%.[7]

According to the annual report, India ranks third lowest compared to the 15 other high burden countries for its Global Action Plan for Pneumonia and Diarrhoea (GAPPD) score – a calculated average of coverage levels for the viral pneumonia and diarrhoea interventions outlined in the World Health Organization (WHO) and UNICEF's integrated GAPPD.[8]

Therefore, this study was done to identify the environmental risk factors for acute lower respiratory tract infection in children.

## MATERIALS AND METHOD

This is an observational comparative study of 150 patients and 150 controls conducted in Tertiary care centre in metropolitan city during the two year period.

***Inclusion criteria-***150 Children of age 2 months to 14 years admitted with clinical diagnosis of acute lower respiratory tract infection (ALRI) were taken as cases and 150 children of same age group who did not have acute lower respiratory tract infection (ALRI) were taken as controls.

***Exclusion criteria-*** 1. Children <2 months and > 14 years age.
2. Children with clinical diagnosis of bronchial asthma and pulmonary Tuberculosis.

***Method of study-*** Approval of Institutional Ethical Committee was obtained. All patients with suspected clinical diagnosis of acute lower respiratory tract infection (ALRI) based on clinical features and laboratory parameters were included in study between 2 months to 14 years of age.

A case of acute lower respiratory tract infection is defined as per ARI control programme as "Presence of cough with fast breathing of >60/minute in <2 month age; >50/minute in 2 month to 12 months and >40/minute in 12 months to 60 mo of age; the duration of illness being <30 days.

**The disease was classified as-**

1. *Very severe pneumonia,* the child with cough or difficult breathing must have the following signs:
- Fast breathing;
- Lower chest wall in drawing,
- Plus at least one of the following: —central cyanosis, inability to breastfeed or drink, vomiting, convulsions, abnormally sleepy or difficult to wake or unconsciousness, severe respiratory distress, nasal flaring, grunting.

2. *Severe pneumonia*,
Cough or difficult breathing,
Fast breathing and,
Lower chest wall in drawing,

3. *Pneumonia (non severe)* the child with cough or difficult breathing with fast breathing and on examination NONE of the signs of severe or very severe pneumonia are present. Other signs of pneumonia (on auscultation) may be present: crackles, reduced breath sounds or an area of bronchial breathing.

4. *NO pneumonia (cough and cold) a* child without fast breathing, lower chest wall in drawing, stridor when the child is calm or absent danger signs.

Controls were the children admitted for non respiratory complaints or outpatients of non ALRI of age group 2 months to 14 years. A detailed history and clinical examination findings were recorded after taking due consent from parents. Appropriate investigations like Chest X ray, Complete Blood Count (CBC), blood culture and sensitivity, blood gas analysis, gastric lavage, Mantoux test and CT thorax were done on

clinical grounds.

**RESULTS- TABLE 1: COOKING FUEL AND INCIDENCE OF ALRI:**

| FUEL USED FOR COOKING | Study Group | | Total |
|---|---|---|---|
| | Cases (n=150) | Control (n=150) | |
| Heater (Electronic) | 6 (4.0%) | 0 (4.0%) | 6 (4.0%) |
| Liquid | 14 (9.3%) | 28 (18.7%) | 42 (14.0%) |
| LPG | 86 (57.3%) | 83 (55.3%) | 169 (56.3%) |
| Solid | 4 (2.7%) | 0 (0.0%) | 4 (1.3%) |
| Solid with other | 40 (26.7%) | 39 (26.0%) | 79 (26.3%) |
| Total | 150 (100.0%) | 150 (100.0%) | 300 (100.0%) |
| Chi-Square test | Df | P Value | Association is |
| Pearson Chi-Square | 4 | 0.005 | Significant |

The association was found to be statistically significant ($p<0.05$) which indicates that cooking fuel in the house, other than LPG (solid and liquid fuels) can predispose children to LRTI.

**TABLE 2: RELATION OF PASSIVE SMOKE INHALATION WITH ALRI**

| SMOKING IN FAMILY | Study Group | | Total |
|---|---|---|---|
| | Cases (n=150) | Control (n=150) | |
| Yes | 98 (65.3%) | 25 (16.7%) | 123 (41.0%) |
| No | 52 (34.7%) | 125 (83.3%) | 177 (59.0%) |
| Total | 150 (100.0%) | 150 (100.0%) | 300 (100.0%) |
| Chi-Square test | df | P Value | Association is |
| Pearson Chi-Square | 1 | 0.000 | Significant |
| Fisher's Exact Test | | 0.000 | Significant |

Ninety eight (65.3%) patients in the study group had history suggestive of exposure to passive smoking as compared to 25 (16.7 %) children in control group. Exposure to smoking by a family member was found to be highly significant in increasing the risk of LRTI in patients ($p<0.05$).Odds ratio for smoking in family is 9.4 and lower limit is 5.4 while upper limit is 16.2.

**DISCUSSION-**

Pneumonia continues to pose a threat to health of children in developed and developing countries despite improvements in socioeconomic status, immunization, early diagnosis and treatment.

Overcrowding in homes has proved to be a major risk factor for ALRI in children in several published studies. In our study too, 81.3 % patients were living in overcrowded homes.

Likewise, D'Souza RM. et al[12] (1997) identified 'Five' household risk factors for respiratory infections:

The number of children under 5;
Poor housing structure,

***Increased household density*,**
Humidity inside the house less than the humidity outside house and Frequent cooking inside the house.

Similarly Jaimes MB et al[13] (2003) found significant risk factors for severe ALRI - (a) living in borrowed houses (odds ratio (OR) = 2.7; 95% Confidence Interval (CI): 1.06-7.07), (b)sharing the bed (OR = 1.88, CI: 1.0-3.7),(c) *living with more than 9 people (OR = 1.82, CI: 1.0-3.51)* and(d) living with smokers (OR = 1.4, CI: 1.0-2.05).

In year 2003 Prietsch SO et al[10] identified environmental score >/= 3 points, maternal schooling < 5 years, monthly family income < US$ 200, *four or more people sharing the child's bedroom*, and maternal smoking as the main risk factors for ALRI in young children. In year 2007, Savitha et al[9] found that overcrowding was present in 91.35% cases. Meta analysis of 36 studies by Jackson et al [11] (2013) suggested 19 risk factors for severe ALRI of which crowding (>7 persons per household) is one such risk factor (OR-1.96; CI 1.53-2.52)

**CONCLUSIONS-**

The majority of respiratory infections in children are preventable or treatable.[6]

Protection against pneumonia through[6] -
Parent Education Programs,
Pneumonia awareness workshops and

Community awareness of practices of personal hygiene like hand washing and reduction of the use of materials like fire-wood and kerosene which cause indoor air pollution. Such awareness can be created through the support of community leaders such as politicians and religious leaders.

Therefore, knowledge of risk factors related to acquisition of ALRI will help in prevention, through effective health education of the community and appropriate initiatives taken by the government, leading to a healthy community and a healthy nation as a whole.

**References-**


1. Garenne M, Ronsmans C, Campbell H. The magnitude of mortality from acute respiratory infections in children under 5 years in developing countries. World Health Stat Q. 1992;45
2. Anonymous: Epidemiology of acute respiratory tract infections. Bulletin of the world Health organization. 1998; 76: 101-103.
3. Hyam N. Bashour, Roger H. Webber, and Thomas F. A community- based study of acute respiratory infection among pre school children in Syria. Journal of tropical pediatrics. 1994 ; 40:207-211.
4. Importance of respiratory viruses in acute otitis media. April 2003. Retrieved 1 December, 2004, from http: //www. Google. Internet / / Tips for better browsing / CMR. Clinical microbiology reviews
5. WHO/UNICEF. Global Action Plan for Prevention and Control of Pneumonia (GAPP). WHO (Geneva); 2009.http://www.unicef.org/media/files/GAPP3
6. IAP RECOMMENDATIONS FOR PROTECTION AGAINST PREVENTION OF,AND TREATMENT,OF CHILDHOOD PNEUMONIA.
7. www.who.int/gho/child_health/prevention/pneumonitext/en
8. http://indianexpress.com/article/lifestyle/health/world-pneumonia-day-india-still-struggles-with-pneumonia-and-diarrhea-deaths-says-report/#sthash.1xFmzqIv.dpuf
9. Savitha MR, Nandeeshwara SB, Pradeep Kumar MJ, ul-Haque F, Raju CK. Modifiable risk factors for acute lower respiratory tract infections. Indian J Pediatr. 2007 May;74(5):477-82. PubMed PMID: 17526960.
10. Prietsch SO, Fischer GB, César JA, Lempek BS, Barbosa LV Jr, Zogbi L, Cardoso OC, Santos AM. [Respiratory illnesses in children younger than 5 years of age in southern Brazil: the influence of the home environment]. Rev Panam Salud Publica.2003 May;13(5):303-10. Portuguese. PubMed PMID: 12831434.
11. Jackson S, Mathews KH, Pulanić D, et al. Risk factors for severe acute lower respiratory infections in children – a systematic review and meta-analysis.Croatian Medical Journal 2013;54(2):110-121. doi:10.3325/cmj.2013.54.110.
12. 12. D'Souza RM. Housing and environmental factors and their effects on the health of children in the slums of Karachi, Pakistan. J Biosoc Sci. 1997 Jul;29(3):271-81. PubMed PMID: 9881135.
13. Jaimes MB, Cáceres DC, de la Hoz F, Gutiérrez C, Herrera D, Pinilla J, Porras A, Rodríguez F, Velandia M. [Risk factors for severe acute lower respiratorytract infection in Bogota, 2001]. Biomedica. 2003 Sep;23(3):283-92. Spanish.PubMed PMID: 14582331.