Section: Miscellaneous

Original Research Article

THE STUDY OF VARIOUS ENVIRONMENTAL FACTORS RELATED TO ACUTE RESPIRATORY INFECTION (ARI) AMONG 1 to 15 YEARS CHILDREN

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ABSTRACT

Background: Among children, one of the main causes of morbidity and death is acute respiratory infection (ARI). Because of their constantly changing developmental physiology, children are more susceptible to environmental exposures that determine respiratory disorders. On the other hand, children exposed to environmental risk factors also have a higher risk of these diseases when it comes to social determinants of health. Acute respiratory infections (ARIs) are more likely to occur and be fatal due to a number of causes. These included living situations that were subpar, seasonal fluctuations, exposure to indoor and outdoor pollutants, low birth weight, inadequate breastfeeding, malnourishment, inadequate housing arrangements, inadequate sanitation, and limited access to preventative and therapeutic services.

Materials and Methods: In Jagdalpur, Chhattisgarh, at the government Medical College and Hospital, the study was carried out. The study had childrens under the age of fifteen as participants. In total, there were 59 samples. A systematic random sample was the sample technique employed. The study informant, the mother of the child, was interviewed using a pretested semi-structured questionnaire. SPSS was used for statistical analysis after three months of data collection. All children below 15 years of age were included in this study.

Results: In this study, there were 59 participants; 28 were girls and 31 were boys. Of the thirty-one boys, ten were one to five years old, thirteen were five to ten years old, and eighteen were ten to fifteen years old. Of the twenty-eight girls, six were one to five years old, ten were five to ten years old, and twelve were ten to fifteen years old. There were 40 individuals with upper respiratory tract infections and 19 with lower respiratory tract infections. Ten people had bacterial infections, eleven had mixed ARIs and 38 had viral infections.18 people reported nasal blockage, 14 people had sore throats, 20 people had cough.

Conclusion: Environment played a major role in childhood acute respiratory infections. By implementing programs to improve community awareness and economic standing as prevention strategies against childhood ARI. It should be the duty of general practitioners and pediatricians to give caregivers the proper advice on how to take care of their children at home.

Keywords: Acute Respiratory Infection, Environmental Factors, Children.

INTRODUCTION

Worldwide, acute respiratory infections (ARI) in young children are thought to be the cause of 3.9 million deaths per year. Ninety percent of ARI fatalities are caused by pneumonia, which is typically bacterial in nature. A child under the age of five experiences four to five episodes of acute respiratory illness (ARI) year, translating to an estimated 238 million incidents. As a result, even

though the majority of attacks are brief and self-limiting events.[1]

Because of the high morbidity and mortality rates associated with ARI, developing nations' health systems face significant challenges. Together, Bangladesh, India, Indonesia, and Nepal are thought to be responsible for 40% of all ARI deaths worldwide. It's interesting to note that babies who are under-breastfed and live in crowded environments are more susceptible to ARI-related disorders. In India, 20–40% of hospital admissions and 30–50% of visits to medical institutions are related to ARI.ARI makes for more than two thirds of all pediatric diseases in urban slum settings. Despite these figures, the bulk of the information that has been published understates the true cost of ARI to the community.[2]

Breathing normally becomes difficult due to an infection called ARI. Depending on where the illness occurs, there are two types of acute respiratory infections: acute lower respiratory infections and acute upper respiratory infections. The upper tract consists of the airways that connect the voice cords in the larynx to the nose. The lower tract includes the alveoli and the passage of airways from the trachea and bronchi to the bronchioles. All age groups and sexes combined, respiratory disease is the leading cause of morbidity and mortality in low- and middle-income countries.[3]

Three major risk factors—overcrowding, ignorance, and a lack of access to basic health services—are responsible for the incidence of ARI in rural areas. In addition to the specific risk factors already discussed, there are important and changeable environmental factors that also contribute to proportionate morbidity and death in children under five. The usage of solid fuel is one of the major modifiable risk factors in rural India for ARIs, particularly pneumonia. Numerous harmful byproducts of the biomass fuel weaken the respiratory tract's defenses locally, making kids more vulnerable to respiratory illnesses.[4]

Unhealthy environmental exposures are linked to an increased risk of respiratory illnesses. According to the World Health Organization (2018), air pollution, both indoor and outdoor, is responsible for 7 million deaths worldwide. The particularly children who have higher exposure to air pollution because of their dynamic developing physiology and longer life expectancy, are more exposed to the mortality and burden of these diseases (Sly and Flack, 2008). According to Zhuge et al. (2020), exposure to indoor tobacco smoke is linked to respiratory symptoms and a rise in the prevalence of respiratory illnesses in children, such as rhinitis, asthma, and respiratory tract infections. Children who are exposed to ambient airborne particulate matter (PM) are more susceptible to asthma, pneumonia, and acute lower respiratory infections (Davila Cordova et al., 2020).[5]

MATERIAL AND METHODS

This study is a cross-sectional descriptive study conducted in the community. The study was conducted in Jagdalpur, Chhattisgarh, at the government Medical College and Hospital. The study was conducted with youngsters under the age of fifteen. The child's mother was the informant. The research was done between February and August of 2021.It included 59 samples in all. Systematic Random sample was the sample technique employed. The child's mother, the study informant, was interviewed using a pretested semi-structured questionnaire. The investigators visited the study participants' homes one by one to gather data. If the child was accepted into a school or Anganwadi center, the field workers created a cumulative list, and each child was interviewed at home. Data was collected for 3 months.

Inclusion Criteria

- Any child below 15 years of age residing with their families.
- Whose parents were willing to participate in the study.

Exclusion Criteria

- Parents who were unwilling to participate in the study with their child.
- Those who are not permanent residents of the study area.

Statistical Analysis: The gathered information was put into a Microsoft Excel spreadsheet, which was then exported to the data editor of SPSS Version 20.0.

RESULTS

Table 1 shows age distribution of study subjects. Of the 59 participants in this study, 28 were girls and 31 were boy. Of the thirty-one boys, ten were between the ages of one and five, thirteen were between the ages of five and ten, and eighteen were between the ages of ten and fifteen. Of the 28 girls, six were between the ages of 1 and 5, ten were between the ages of 5 and 10, and twelve were between the ages of 10 and 15. [Table 1]

Out of 59 subjects, 40 subjects were of upper respiratory tract infection and 19 subjects were of lower respiratory tract infection. [Table 2]

Of the 59 participants, 38 had a viral infection, 10 had a bacterial infection, and 11 had a mixed ARI. [Table 3]

Of the 59 participants, 18 experienced nasal blockage, 14 subjects had sore throats, 20 subjects were suffered with coughs, 2 had conjunctivitis, and 5 had fever. [Table 4]

Table 1: Age Distribution of Study Subjects

Age	No of Boys	No of Girls
1 – 5 Years	10	06
5 - 10 Years	13	10
10 – 15 Years	18	12
Total	31	28

Table 2: Distribution of Children Among Upper Respiratory and Lower Respiratory Infection

Respiratory Tract Infections	No of Children
Upper Respiratory Tract Infections	40
Lower Respiratory Tract Infections	19
Total	59

Table 3: Frequency of Acute Respiratory Infection

Frequency of ARI	No of Children Infected
Frequency of Viral ARI	38
Frequency of Bacterial ARI	10
Frequency of Mixed ARI	11
Total	59

Table 4: Symptoms of Acute Respiratory Infections

Symptoms of Acute Respiratory Infection	No of Children
Nasal Obstruction	18
Sore Throat	14
Cough	20
Conjunctivitis	02
Fever	05
Total	59

DISCUSSION

As evidenced by the significantly greater risks of ARI in those living in homes without windows, inadequate ventilation was strongly linked to ARI. It has also been demonstrated that living in homes without windows significantly increases the incidence of children ARI in Kenya (Sikolia et al., 2012). In a similar vein, children in Kashmir had 4.9-fold (95% CI 3.78–6.26) higher risks of ARI when they had inadequate ventilation (Mir et al., 2012). Research conducted in India has also demonstrated a high correlation between childhood ARI and inadequate ventilation (Goel et al., 2012, Sharma and Kumaresan Kuppusamy, 2013).[6]

Because of the potential spread of infection or microbial toxins, inflammation, and diminished lung function, ARIs are not limited to the respiratory tract and can have systemic repercussions.[3] ARIs are most common in young children, the elderly, and babies. They are also more prevalent in low- and middle-income nations.[4] During the first five years of life, there are an average of six to eight reported ARI episodes.[5] Pneumonia, a more dangerous illness that accounts for 15% of mortality in Egypt among children under five, is frequently brought on by untreated ARI infections.[6] One in every 36 Egyptian children passed away before turning five, with more than 80% of deaths happening before the infant became one year old, according to the Egyptian Demographic Health Survey (EDHS, 2008).[7]

According to a number of studies, male children are more likely than female children to experience ARI. These studies include those by Choube et al., Prajapati et al., Goel et al., and Leeder et al. Male children are more likely to be afflicted than female children for this reason: male children are more likely to play outside than female children, which expose them to polluted aerosols from the surrounding outdoor environment. When it comes to the correlation between a parent's history of smoking and ARI, more children (51.1%) reported having one or more ARI symptoms than children (38.7%) who had no such history.[8]

Four pillars support the effective programmatic management of pediatric pneumonia: prompt and precise diagnosis of the illness in children, early intervention with targeted therapy, co-morbid condition management, and primary prevention initiatives. To differing degrees, several programs apply these fundamental principles to manage the burden of pediatric pneumonia.

Nevertheless, there are a number of obstacles to overcome in order to successfully design and oversee a program that lowers childhood pneumonia-related mortality and morbidity, calling for regular evaluation and reconsideration.[9]

There have been reports of bacterial pneumonia exacerbating viral influenza during the 1918 pandemic as well as several epidemics and interepidemic intervals since then.S. Pneumonia, S. aureus, H. influenzae, and occasionally other Gram-negative bacteria were the most prevalent pathogens. Methicillin-resistant Staphylococcus aureus (MRSA) instances of severe community-acquired pneumonia during the 2006–2007 influenza seasons were reported with a 33% fatality rate. These demonstrate a rise in morbidity and

death when influenza is linked to bacterial invasion and binding in addition to viral.

The influenza virus and bacteria have most fully been understood to interact with S. pneumonia, where the virus's neuraminidase cleaves sialic acid to release fresh viral particles from host cells.[10]

CONCLUSION

Early childhood diseases like ARI and pneumonia have a high death and morbidity rate, with the burden falling more heavily on developing countries than on developed ones. Environmental factors that have a substantial impact on childhood acute respiratory infections include smoking, poor water quality, high living density, and a lack of restroom facilities. Vaccination approaches for disease prevention have a good track record when it comes to infections that require obligate human hosts. By putting interventions in place to raise economic status and raising community knowledge of indoor pollution and ventilation as preventative measures against ARI in children, the incidence of ARI may be decreased. General practitioners and pediatricians should assume responsibility for providing caregivers with appropriate guidance on how to care for their children at home.

REFERENCES

1. Abid Ali Mir, Imtiyaz A, Anjum Fazili, Javeed Iqbal, Rohul Jabeen and Anjali Salathia. Prevalence and Risk Factor Analysis of Acute Respiratory tract Infections in Rural areas of Kashmir valley under 5 Years of Age. International Journal of Medicine and Public Health.2012; Vol.2 (3).
2. S Ganesh Kumar, Anindo Majumdar, Veera Kumar, Bijay Nanda Naik, Kalaiselvi Selvaraj, and Karthik Balajee. Prevalence of acute respiratory infection among under-five children in urban and rural areas of puducherry, India. J Nat Sci Biol Med. 2015 Jan-Jun; 6(1): 3–6.
3. Amanuel Mengistu Merera. Determinants of acute respiratory infection among under-fve children in rural Ethiopia. BMC Infectious Diseases.2021; 21:1203.
4. Divya Krishnan et al. Prevalence of acute respiratory infection in children less than 2 years in rural and urban population in and around Chennai, Tamil Nadu. National Journal of Physiology, Pharmacy and Pharmacology.2019;9(8)
5. Javier Cortes-Ramirez a,b,c,* , Juan D. Wilches-Vega c , Olga M. Paris-Pineda c , J.E. Rod d,e , Lkhagvadulam Ayurzana f , Peter D. Sly. Environmental risk factors associated with respiratory diseases in children with socioeconomic disadvantage. Heliyon.2021; 7(4), e06820.
6. Seada Hassena et al. Determinants of acute respiratory infection (ARI) among under-five children in rural areas of Legambo District, South Wollo Zone, Ethiopia: A matched case–control study. International Journal of Infectious Diseases.2020; 96: 688–695.
7. Ekram M. Abdel Khalek, Doaa M. Abdel-Salam. Cute respiratory tract infections in children under 5 years of age in Upper Egypt. International Journal of Community Medicine and Public Health. 2016 May; 3(5):1161-1166.
8. A. K. Savitha1 and S. Gopalakrishnan. Determinants of acute respiratory infections among under five children in a rural area of Tamil Nadu, India. J Family Med Prim Care. 2018 Nov-Dec; 7(6): 1268–1273.
9. JOSEPH L MATHEW et al. Acute Respiratory Infection and Pneumonia in India: A Systematic Review of Literature for Advocacy and Action: UNICEF-PHFI Series on Newborn and Child Health, India. INDIAN PEDIATRICS.2011, 48.
10. RD Chavan, ST Kothari, K Zunjarrao, AS Chowdhary. Surveillance of Acute Respiratory Infections in Mumbai during 2011-12. Indian Journal of Medical Microbiology, (2015) 33(1): 43-50.