International Journal of Multidisciplinary Approach and Studies

ISSN NO:: 2348 – 537X

"A Study on Acute Respiratory Tract Infections among Children Aged 1-5 Years,"

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ABSTRACT

Background: *Acute Respiratory Tract Infections (ARTIs) are among the leading causes of morbidity and mortality in children under five years of age, particularly in developing countries. These infections, including upper and lower respiratory tract infections, significantly contribute to the global disease burden, with pneumonia being a major cause of child deaths. Despite global initiatives, the prevalence of ARTI remains high in countries like India due to various socio-demographic and environmental risk factors.*

Aim: To study the frequency of Acute Respiratory Tract Infections (ARTI) in the past one year among children aged 1–5 years attending an immunization clinic at a tertiary care hospital.

Objectives: To assess socio-demographic characteristics, determine the frequency of ARTI, and identify the association between ARTI and its risk factors among children.

Methods: A cross-sectional study was conducted from November 2024 to June 2025 at immunization clinics of selected private hospitals in Indore. A total of 250 children aged 1–5 years were selected using a non-probability convenience sampling technique. Data were collected through face-to-face interviews with mothers using a semi-structured questionnaire. Statistical analysis included descriptive and inferential statistics to identify associations between ARTI and risk factors.

Results: Among the 250 children, 52.8% were females and 47.2% were males, with the majority (40%) in the 1–2 years age group. More than four episodes of ARTI per year were reported in 60% of children. Significant risk factors associated with increased frequency of ARTI included low maternal education (45.8%, p = 0.002), inadequate ventilation (42.4%, p = 0.000), use of biomass fuel (50%, p = 0.002), preterm birth (33.3%, p = 0.02), and low birth weight (29.2%, p = 0.009). Other contributing factors included poor immunization status, lack of exclusive breastfeeding, and exposure to passive smoking.

Conclusion: The study concludes that ARTI remains a major public health problem among children aged 1–5 years. Modifiable risk factors such as poor housing conditions, low maternal education, and environmental exposures play a significant role in increasing ARTI frequency. Strengthening maternal awareness, improving living conditions, and enhancing child healthcare services are essential to reduce the burden of ARTI.

KEYWORDS: *Acute Respiratory Tract Infection (ARTI), Under-Five Children, Risk Factors, Pneumonia, Maternal Education, Biomass Fuel, Ventilation, Low Birth Weight, Preterm Birth, Child Health*

INTRODUCTION:

Acute respiratory infection (ARI) is an infection of the respiratory tract that interferes the normal breathing of an individual [1]. ARI is classified into Upper Respira- tory Infection (URI) and Lower Respiratory Infection (LRI) [2]. They are a major cause of mortality and mor- bidity among under-five children worldwide, particularly in developing countries [3]. For instance, according to the Global Burden of Disease Study 2019, lower respiratory infections are the second leading cause of death among children under five years old [4]. Highlighting the sever- ity of the disease, the World Health Organization (WHO) and United Nations (UN) suggested that ARIs should be addressed as 'presumed pneumonia' [5]. In an effort to reduce deaths due to pneumonia, the Global Action Plan for Prevention and Control of Pneumonia was developed in 2009 [6]. However, since pneumonia and diarrhea share the same determinants, it was recognized that the prevention and control strategies of both diseases should be coordinated. Accordingly, in 2013, the Integrated Global Action Plan for Pneumonia and Diarrhea was implemented with an aim to end preventable child deaths due to pneumonia and diarrhea by 2025 [7]. Despite the global strategies to end pneumonia deaths, over two- thirds of the worldwide burden of pneumonia and diar- rhea mortality occur in just fifteen countries. Further, nearly half a million pneumonia and diarrhea deaths occur in just two countries- India and Nigeria. In India, the death rate in children under five years (per 1000 live births) due to pneumonia was 6.3 in 2016 [8].

Identifying the risk factors of ARI is imperative to reduce the mortality and morbidity burden due to ARI. Accordingly, previous studies have identified several household, maternal, and child characteristics as risk fac- tors for the infection. These include age, gender, nutri- tional status, and household income [9–13, 15]. Earlier evidence suggests that the incidence of ARI is higher among older, male children [9–11] Further, malnour- ished children and those from poor households have a higher risk of contracting the infection [12, 13, 15]. Studies have also found that children who suffered from diarrhea recently have a higher likelihood of developing ARI [3, 16]. The adverse impact of the use of solid fuels for cooking on the incidence of respiratory tract infec- tions has been established in a multitude of studies con- ducted in India [14, 15, 17, 18] The detrimental effect of the alternate sources of indoor air pollution, includ- ing the unavailability of a separate room as kitchen and second-hand smoke exposure, has been highlighted in a cross-sectional study in India [18]. Further, a quantitative systematic review of studies from developed countries

FIGURE NO 1 ACUTE RESPIRATORY TRACT INFECTION UNDER 5 CHILDREN

Children are our future. The development of children is basically affected by what happens to their health status during early years of life.[1] Investing in children health & development means investing in the future of a nation. [2]

Estimation of the global burden of child mortality attributable to ARI has played a crucial role in refocusing the attention of researchers and policy-makers on the importance of maintaining optimal maternal–child health for promoting neonatal, infant and child survival, including the prevention of mortality due to severe acute lower respiratory infection (ALRI). The most important and crucial data available have been reviewed and collected in the developing countries about the efficacy and effectiveness of specific interventions concerned to reduce the incidence, morbidity and the mortality of global childhood ALRI to enhance the public health knowledge regarding the disastrous effects of childhood ALRI and poor nutrition.[3]

Acute Respiratory Tract Infection among children is with any one or various combinations of clinical manifestations like common cold, having a running or blocked nose, cough, sore throat, noisy and rapid breathing pattern, child reluctant to feeding and or drinking and indrawing of the chest.[4]

Acute Respiratory tract infection is considered as one of the major public health problems and it is recognized as the leading cause of mortality & morbidity in many countries. The biggest problem for developing countries is the mortality from ARI in children less than five year of age. Acute Respiratory Infection (ARI), particularly Lower Respiratory Tract Infections (LRTI) is the leading cause of under-five morbidity which is estimated about two million childhood death globally. In the developing countries among all under-five deaths one-fifth is due to ARI that is estimated 12 million deaths per year. It is estimated that, among global ARI mortality about 40% accounts from Bangladesh, India and Nepal.[5]

Upper Respiratory Tract Infections are the most common respiratory infections in children resulting in infection of ear, nose, throat and the sinuses. The cardinal features of URTI are stiffy or running nose, sore throat, sneezing, fever, anorexia, fatigue, headache and body aches. The most common lower respiratory tract infections among children are bronchitis and pneumonia.[5]

Since Acute Respiratory Infections are fatal and are the cause of major mortality among children, important measures like aid, academics and research have all been focused by World Health Organization (WHO), United Nations Children's Fund (UNICEF) as well as various national, state and local governments.[6]

It is estimated that, out of 25 million babies born about 24% (6 million) babies die annually in India. Among these, out of 10 babies 7 die due to Acute Respiratory Infections. In developing countries, clinical pneumonia incidence is about 20-30%. In the Millennium Development Goal (MDG) there is a major focus on reduction of two thirds of under-five mortality rate.[7]

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.

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.

Problem statement:

A cross-sectional study to assess Acute Respiratory Tract Infections (ARI) among children aged 1–5 years attending a tertiary care hospital in Indore.

OBJECTIVES:

1. To assess the socio-demographic characteristics of the study subjects.
2. To determine the frequency of Acute Respiratory Infections among children aged 1–5 years.
3. To identify the association between the frequency of ARI and its risk factors among the study subjects.

Measuring Tools Semi structured questionnaire Instrument (Inch tape)

Data Collection: Data were collected using a self-administered semi-structured questionnaire designed specifically for the study. The investigator conducted face-to-face interviews with the mothers of the children, and their responses were recorded accordingly. Participants were informed that the information would remain confidential and used solely for research purposes. Verbal consent was obtained prior to data collection. A total of 250 completed questionnaires were included in the final analysis.

Materials and Methods: A cross-sectional study was conducted at the immunization clinics of selected private hospitals in Indore from November 2024 to June 2025. The study population included children aged 1–5 years attending the immunization clinic.

The sample size of 250 was calculated based on a previously reported prevalence of ARI (41.6%) among children under five years. A non-probability convenience sampling technique was employed to select the participants.

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.

FINDINGS AND DISCUSSION

In the present study, a total of 250 children aged 1–5 years were included, of which 47.2% were males and 52.8% were females. The majority of children (40%) belonged to the age group of 12–24 months, followed by 27.6% in the 24–36 months age group. Most participants (45.2%) were from the upper socioeconomic class. A large proportion of the children (80%) belonged to nuclear families, while 20% were from joint families.

The study identified several factors associated with the increased frequency of Acute Respiratory Infections (ARI). Children with low birth weight showed a higher frequency of ARI (29.2%), and this association was found to be statistically significant (p = 0.006). Similar findings were reported by Mahesh B. Tondare et al., supporting the role of low birth weight as a risk factor for ARI.

Use of biomass fuel by mothers was associated with a higher frequency of ARI (50%), with a statistically significant relationship (p = 0.000). This finding is consistent with the study conducted by Azad et al. (2018), which also established a strong link between biomass fuel exposure and ARI.

Preterm children demonstrated a higher frequency of ARI (33.3%) compared to term children (14%), and this association was statistically significant (p = 0.024). Birth order, although showing a higher frequency of ARI in fourth-order children (50%), did not demonstrate a statistically significant association. Similar observations were reported by Mitra NK, where a higher proportion of ARTI cases were noted in children with higher birth order.

Exclusive breastfeeding did not show a statistically significant association in this study; however, a higher frequency of ARI was observed among non-exclusively breastfed children. This finding aligns with studies by Mathew J. L. et al., which indicate that inadequate breastfeeding practices contribute to increased ARI risk.

Children exposed to passive cigarette smoke had a slightly higher frequency of ARI (16.4%) compared to non-exposed children (15.8%). Previous studies by Ujunwa FA and Ezeonu CT have also emphasized the role of passive smoking in increasing the severity of ARI.

Immunization status showed that children who were not adequately immunized had a higher occurrence of ARI (25%) compared to fully immunized children (15.9%), consistent with findings from Arun et al.

Maternal education emerged as a significant determinant, with children of mothers having no formal education showing a higher frequency of ARI (45.8%), and the association was statistically significant (p = 0.002). Similar results were observed in studies by Syed Abid Asghar et al.

Severe malnutrition was associated with a 24.4% prevalence of ARI; however, no statistically significant relationship was found in this study. In contrast, previous research by Savitha M. R. et al. has demonstrated a strong association between malnutrition and ARI.

Environmental factors such as inadequate ventilation were significantly associated with increased ARI frequency (42.4%, p = 0.000). This is in agreement with findings by Asghar et al., who reported a high prevalence of inadequate ventilation among ARI cases. However, overcrowding did not show a significant association in this study, although Prajapati et al. reported a notable link between overcrowding and ARI incidence.

Ethical Considerations

The study involved no interventions or invasive procedures, thereby imposing no financial or physical burden on participants. Prior to data collection, mothers or caregivers were informed about the purpose and objectives of the study. Informed consent was obtained, and confidentiality of the information was strictly maintained. Data were collected solely through a structured questionnaire administered to caregivers.

CONCLUSION

The study concludes that key risk factors contributing to the increased frequency of Acute Respiratory Infections (ARI) among children under five years include low maternal education, inadequate household ventilation, use of biomass fuel, preterm birth, and low birth weight. Addressing these factors through targeted health education and environmental improvements may help reduce the burden of ARI in this population.

RECOMMENDATIONS

Raising awareness about the risk factors associated with Acute Respiratory Infections (ARI) is essential for reducing the disease burden among under-five children. Health education programs should focus on improving maternal knowledge, especially regarding child care practices and environmental risk factors. Efforts should be made to enhance housing conditions, particularly ensuring adequate ventilation and reducing the use of biomass fuels. Additionally, strengthening antenatal care services can help in preventing preterm births and low birth weight, thereby contributing to a reduction in ARI-related morbidity.

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