Original article:

Clinical Profile and Risk Factors of Acute Respiratory Infections in Adult Patients Attending a Tertiary Care Hospital: A Cross-Sectional Study

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Abstract:

Background - Acute respiratory infections (ARIs) are a major cause of morbidity and mortality among adult patients, particularly in developing countries. The burden is higher among elderly individuals and those with underlying comorbidities, with lower respiratory tract infections contributing significantly to hospitalizations and adverse outcomes.

Objective- To assess the clinical profile and associated risk factors of acute respiratory infections in adult patients attending a tertiary care hospital.

Methods- This hospital-based cross-sectional study was conducted over six months in the Department of Medicine. A total of 300 adult patients (≥18 years) presenting with symptoms suggestive of ARI were included. Data on demographic characteristics, clinical presentation, comorbidities, environmental exposures, and vaccination status were collected using a structured proforma. Patients were clinically categorized into upper and lower respiratory tract infections. Statistical analysis was performed using descriptive statistics, chi-square test, and logistic regression to identify significant risk factors.

Results- The majority of patients were in the 41–60 years age group, with a male predominance. Common symptoms included cough (92%), fever (86%), and breathlessness (54%). Lower respiratory tract infections accounted for 46% of cases, with community-acquired pneumonia being the most frequent diagnosis. Significant risk factors associated with severe ARI included smoking ($p = 0.001$), COPD ($p = 0.002$), diabetes mellitus ($p = 0.01$), exposure to indoor air pollution ($p = 0.003$), and lack of vaccination ($p = 0.02$). About 18% of patients required ICU admission, and the overall mortality rate was 10%.

Conclusion- ARIs in adults are associated with a significant clinical burden, particularly in patients with comorbidities and modifiable risk factors. Early diagnosis, risk stratification, and preventive strategies such as smoking cessation, vaccination, and control of comorbid conditions are essential to reduce disease severity and improve outcomes.

Keywords-Acute respiratory infections, Pneumonia, Risk factors, Comorbidities, Smoking, COPD, Indoor air pollution, ICU admission

Introduction:

Acute respiratory infections (ARIs) are a significant cause of morbidity and mortality among adult patients worldwide, particularly in low- and middle-income countries (1). In adults, ARIs range from mild upper respiratory tract infections to severe lower respiratory tract infections, including pneumonia, which can progress to respiratory failure and sepsis if not managed promptly (2). The burden is especially high among the elderly and individuals with underlying comorbidities such as chronic obstructive pulmonary disease (COPD), diabetes mellitus, cardiovascular disease, and chronic kidney disease (3).

Globally, lower respiratory tract infections were among the leading causes of death in the early 2010s, contributing substantially to hospital admissions and healthcare utilization (4). In India and similar settings, factors such as overcrowding, air pollution, tobacco smoking, and limited access to healthcare further increase the risk and severity of ARIs in adults (5). In addition, hospital-acquired infections contribute significantly to the burden, particularly in critically ill patients and those requiring prolonged hospitalization (6).

The clinical presentation of ARIs in adults commonly includes fever, cough, sputum production, and breathlessness. However, the severity may vary widely depending on host factors, pathogen virulence, and timely initiation of treatment (2). Early identification of high-risk patients is crucial to prevent complications such as severe pneumonia, respiratory failure, and septic shock (7).

Several risk factors have been implicated in the development and progression of ARIs in adults. Smoking remains one of the most important modifiable risk factors, impairing mucociliary clearance and host immune defenses (8). Environmental exposure to indoor air pollution, especially from fuels, remains a major concern in developing countries (5). Comorbid conditions such as diabetes and COPD further predispose individuals to severe infections and poor outcomes (3). Nutritional status and vaccination coverage (influenza and pneumococcal vaccines) also play an important role in determining susceptibility and disease severity (9).

Despite the high burden of ARIs, there is limited region-specific data focusing on the clinical profile and associated risk factors among adult patients in tertiary care settings. Understanding these factors is essential for early diagnosis, appropriate management, and implementation of preventive strategies. Therefore, the present study was undertaken to assess the clinical profile and risk factors associated with acute respiratory infections in adult patients attending a tertiary care hospital.

Material and Methods

Materials and Methods

This hospital-based cross-sectional observational study was conducted in the Department of Medicine at a tertiary care teaching hospital over a period of six months. The study included adult patients aged 18 years and above who presented to the outpatient and inpatient departments with clinical features suggestive of acute respiratory infection (ARI).

All consecutive adult patients presenting with symptoms of ARI, defined as the presence of cough, fever, sputum production, or breathlessness of less than two weeks duration, were included in the study. Patients with known chronic respiratory diseases such as bronchial asthma, pulmonary tuberculosis, interstitial lung disease, or those with documented immunodeficiency were excluded to minimize confounding factors.

Data Collection

After obtaining informed consent, data were collected using a structured and pre-tested proforma. Demographic characteristics such as age, sex, and residence were recorded. Detailed histories were obtained regarding smoking habits, alcohol consumption, occupational exposure, and environmental factors, including indoor air pollution.

Clinical history regarding duration and nature of symptoms was noted. Comorbid conditions such as diabetes mellitus, chronic obstructive pulmonary disease (COPD), hypertension, and chronic kidney disease were documented. Vaccination history, including influenza and pneumococcal vaccination, was also recorded wherever available.

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Clinical Assessment

All patients underwent thorough clinical examination, including measurement of vital parameters such as temperature, respiratory rate, heart rate, blood pressure, and oxygen saturation. Respiratory system examination was performed to assess the severity of infection. Based on clinical evaluation and relevant investigations, patients were categorized into upper respiratory tract infection (URTI), lower respiratory tract infection (LRTI), community-acquired pneumonia (CAP), or hospital-acquired pneumonia (HAP).

Severity assessment was done clinically, and patients requiring hospitalization or intensive care were identified based on standard clinical criteria.

Nutritional and Risk Factor Assessment

Nutritional status was assessed using body mass index (BMI). Risk factors such as smoking, alcohol use, exposure to biomass fuel, and presence of comorbidities were evaluated for their association with disease severity.

Investigations

Relevant laboratory and radiological investigations, including complete blood counts, chest radiography, and other tests as clinically indicated, were performed to support diagnosis and classification of ARI.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using statistical software. Descriptive statistics such as frequencies and percentages were used to summarize categorical variables. The chi-square test was applied to assess the association between risk factors and ARI severity. Logistic regression analysis was performed to identify independent predictors of severe disease. A p-value of less than 0.05 was considered statistically significant.

Results:

A total of 300 adult patients with clinical features suggestive of acute respiratory infection (ARI) were included in the study.

Table 1: Baseline Clinical Characteristics of Adult Patients with ARI (n = 300)

Variable	**Number (%)**
Age Group	
18–40 years	102 (34.0%)
41–60 years	118 (39.3%)
>60 years	80 (26.7%)
Gender	
Male	186 (62.0%)
Female	114 (38.0%)
Residence	
Urban	138 (46.0%)
Rural	162 (54.0%)

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Presenting Symptoms	
Cough	276 (92.0%)
Fever	258 (86.0%)
Breathlessness	162 (54.0%)
Sputum production	148 (49.3%)
Comorbidities	
Diabetes mellitus	96 (32.0%)
COPD	72 (24.0%)
Hypertension	84 (28.0%)
Chronic kidney disease	36 (12.0%)

The majority of patients belonged to the 41–60 years age group (39.3%), followed by 18–40 years (34.0%). There was a male predominance (62.0%). Most patients presented with cough (92.0%) and fever (86.0%), while more than half had breathlessness (54.0%), indicating significant lower respiratory involvement. A high proportion of patients had comorbid conditions, particularly diabetes mellitus (32.0%) and COPD (24.0%), suggesting increased vulnerability to ARIs.

Table 2: Clinical Classification and Severity of ARI (n = 300)

Parameter	**Number (%)**
Type of Infection	
URTI	162 (54.0%)
LRTI	138 (46.0%)
Clinical Diagnosis	
Acute bronchitis	96 (32.0%)
Community-acquired pneumonia (CAP)	102 (34.0%)
Hospital-acquired pneumonia (HAP)	36 (12.0%)
Others	66 (22.0%)
Severity Indicators	
Hypoxia ($SpO_2 < 90\%$)	78 (26.0%)
ICU admission	54 (18.0%)
Mechanical ventilation	36 (12.0%)

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Upper respiratory tract infections were slightly more common (54.0%) than lower respiratory tract infections (46.0%). Among lower respiratory infections, community-acquired pneumonia was the most frequent diagnosis (34.0%), followed by acute bronchitis. A significant proportion of patients developed hypoxia (26.0%), and 18.0% required ICU admission, reflecting the clinical severity of ARIs in adults.

Table 3: Risk Factors Associated with ARI Severity (n = 300)

Risk Factor	Severe ARI n (%)	Non-severe ARI n (%)	p-value
Smoking	68 (62.4%)	54 (28.7%)	**0.001**
COPD	46 (42.2%)	26 (13.8%)	**0.002**
Diabetes mellitus	52 (47.7%)	44 (23.4%)	**0.01**
Indoor pollution exposure	60 (55.0%)	48 (25.5%)	**0.003**
Lack of vaccination	72 (66.0%)	82 (43.6%)	**0.02**

(Severe ARI defined as hypoxia, ICU admission, or need for ventilation)

Smoking was significantly associated with severe ARI (62.4%, p = 0.001), making it the most important modifiable risk factor. COPD and diabetes mellitus were also significantly associated with severe disease. Exposure to indoor air pollution showed a strong association with increased severity (p = 0.003). Lack of vaccination against respiratory pathogens was another important contributor to severe outcomes.

Table 4: Outcomes of ARI Patients (n = 300)

Outcome	Number (%)
Recovered	228 (76.0%)
Prolonged hospital stay (>7 days)	42 (14.0%)
ICU stay	54 (18.0%)
Mortality	30 (10.0%)

The majority of patients recovered (76.0%); however, a considerable proportion required ICU care (18.0%). The mortality rate was 10.0%, indicating that ARIs can lead to serious outcomes in adults, particularly in those with severe disease and comorbidities.

Discussion

Acute respiratory infections (ARIs) remain a major cause of morbidity and mortality among adult patients, particularly in developing countries. In the present study, the majority of patients belonged to the middle-aged and elderly population, with a male predominance. This finding is consistent with earlier studies, where higher incidence among males has been attributed to increased exposure to risk factors such as smoking and occupational hazards (10).

The clinical presentation in our study was dominated by cough and fever, followed by breathlessness, indicating significant lower respiratory tract involvement. Similar symptom patterns have been reported in previous studies on adult ARIs and community-acquired pneumonia (CAP), where cough and fever were the most consistent presenting features (2,11). The relatively high proportion of breathlessness in our cohort suggests a greater burden of lower respiratory tract infections and more severe disease.

In this study, lower respiratory tract infections accounted for 46% of cases, with community-acquired pneumonia being the most common diagnosis. This aligns with global data indicating that pneumonia remains a

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leading cause of hospitalization among adults, particularly in older age groups and those with comorbidities (4,11). The presence of hypoxia in 26% of patients and ICU admission in 18% further highlights the clinical severity of ARIs in adults.

Comorbid conditions such as diabetes mellitus and chronic obstructive pulmonary disease (COPD) were found to be significantly associated with severe ARI. These findings are consistent with previous studies demonstrating that underlying chronic diseases impair host immune response and increase susceptibility to severe respiratory infections (3,12). COPD, in particular, predisposes patients to recurrent infections and exacerbations, often leading to hospitalization and increased mortality.

Smoking emerged as the most significant risk factor associated with severe ARI in this study. Smoking impairs mucociliary clearance, disrupts epithelial integrity, and alters immune responses, thereby increasing susceptibility to respiratory infections (8). Similar associations have been reported in earlier studies, reinforcing the importance of smoking cessation as a key preventive strategy.

Environmental exposure, particularly indoor air pollution, was also significantly associated with disease severity. Biomass fuel exposure remains a major public health concern in developing countries and has been linked to increased incidence of respiratory infections (5). Our findings support the need for interventions aimed at reducing indoor air pollution to decrease ARI burden.

Another important finding was the association between lack of vaccination and severe ARI. Influenza and pneumococcal vaccinations have been shown to reduce the incidence and severity of respiratory infections, especially in high-risk populations (9). The relatively low vaccination coverage observed in our study highlights an important gap in preventive healthcare.

The mortality rate observed in this study (10%) reflects the serious nature of ARIs in adults, particularly in those with severe disease and comorbidities. Previous studies have reported similar mortality rates in hospitalized patients with pneumonia and severe respiratory infections (11,12). Early recognition, appropriate antimicrobial therapy, and supportive care are essential to improve outcomes (13,14).

Overall, the findings of this study emphasize that ARIs in adults are influenced by a combination of host factors, environmental exposures, and healthcare-related variables. Identification of modifiable risk factors such as smoking, indoor pollution, and lack of vaccination is crucial for reducing disease burden. Furthermore, early risk stratification and timely management are essential to prevent progression to severe disease and reduce mortality.

Conclusion

Acute respiratory infections (ARIs) remain a major cause of morbidity and mortality in adults, particularly among elderly patients and those with comorbidities. Lower respiratory tract infections, especially pneumonia, were associated with significant severity, including hypoxia, ICU admission, and mortality.

Smoking, COPD, diabetes, indoor air pollution, and lack of vaccination were key risk factors for severe disease. Early diagnosis, appropriate management, and preventive strategies such as smoking cessation, vaccination, and control of comorbid conditions are essential to reduce disease burden and improve outcomes.

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