

Unveiling Risk Factors and Predictors of Atypical Pneumonia, Co-morbid Conditions, and Complications in COVID-19 Patients: Insights from Purwanchal, Uttar Pradesh

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Abstract

Background: Understanding the risk factors and predictors of atypical pneumonia, co-morbid conditions, and complications in COVID-19 patients is crucial for effective management and public health interventions.

Aim: To unveil the demographic characteristics, pre-existing conditions, disease manifestations, complications, predictive factors, and mortality rates among COVID-19 patients in Purwanchal, Uttar Pradesh.

Materials and Methods: A retrospective observational study was conducted, analyzing data from 200 COVID-19 patients admitted to a tertiary care centre in Purwanchal for the duration of six months. Information regarding demographic profiles, pre-existing conditions, disease manifestations, complications, predictive factors, and mortality rates was extracted from electronic medical records. Descriptive statistics and multivariate logistic regression analysis were employed for data analysis.

Results: The study revealed a diverse demographic distribution among COVID-19 patients in Purwanchal, with a mean age of 45.46±11.24 years and a gender distribution of 110 (55%) male and 90 (45%) female participants. Hypertension [76 (38%)], diabetes mellitus [60 (30%)], and obesity [40 (20%)] were prevalent pre-existing conditions. Approximately 140 (70%) of patients developed atypical pneumonia, characterized by radiological findings of ground-glass opacities and consolidations. Complications included acute respiratory distress syndrome [60 (30%)], sepsis [36 (18%)], and thromboembolic events [24 (12%)]. Advanced age (>65 years) (odds ratio (OR) = 2.8; 95% Confidence interval (CI) = 2.0-3.7), hypertension (OR = 2.0; 95% CI = 1.5-2.8), and obesity (OR = 1.7; 95% CI = 1.0-3.7) were identified as significant predictors of severe outcomes.

The overall mortality rate was 15% (n=30), with higher mortality rates observed among older age groups and patients with comorbidities.

Conclusion: This study provides valuable insights into the risk factors and predictors of atypical pneumonia, co-morbid conditions, and complications among COVID-19 patients in Purwanchal, Uttar Pradesh. The findings underscore the importance of targeted interventions and risk stratification strategies to mitigate the impact of COVID-19 and improve patient outcomes in the region.

Keywords: COVID-19, atypical pneumonia, co-morbid conditions, risk factors, predictive factors

Introduction

The COVID-19 pandemic continues to challenge global healthcare systems, necessitating comprehensive investigations into the diverse clinical manifestations, risk factors, and prognostic indicators associated with the disease.¹ Among the myriad complications observed in COVID-19 patients, atypical pneumonia, co-morbid conditions, and various complications represent significant clinical concerns, imposing substantial burdens on patients, healthcare providers, and public health infrastructures.^{1, 2}

Purwanchal, situated in Uttar Pradesh, India, stands as a region marked by its unique socio-demographic characteristics and healthcare dynamics, thereby offering a distinctive context to understand the complexities surrounding COVID-19. Despite the efforts to mitigate the spread of the virus and manage its impact, the region faces challenges in confronting the multifaceted nature of the disease, warranting localized investigations to tailor effective intervention strategies.^{3, 4}

This research aims to delve into the risk factors and predictors associated with atypical pneumonia, co-morbid conditions, and complications among COVID-19 patients in Purwanchal, Uttar Pradesh. By elucidating these factors, we aspire to contribute valuable insights that can inform clinical management protocols, public health policies, and preventive measures tailored to the region's specific needs.

In this study, we adopt a multi-faceted approach, integrating clinical, epidemiological, and demographic data to construct a comprehensive understanding of the disease landscape in Purwanchal. By examining a diverse cohort of COVID-19 patients, we seek to unravel the intricate interplay between various risk factors, disease trajectories, and outcomes, shedding light on potential avenues for intervention and mitigation.

Furthermore, by delineating the determinants of atypical pneumonia, co-morbid conditions, and complications, we endeavor to identify vulnerable populations, elucidate underlying mechanisms, and refine risk stratification models to enhance prognostic accuracy and clinical decision-making.

Through this endeavor, we aspire to not only advance our understanding of COVID-19 but also empower healthcare stakeholders with actionable insights to effectively navigate the challenges posed by the pandemic in Purwanchal, Uttar Pradesh, and beyond. Ultimately, our collective

efforts strive towards the realization of equitable, evidence-based approaches to mitigate the impact of COVID-19 and safeguard public health in diverse communities.

Materials and Methods

Study Design and Population

This study employed a retrospective observational design to analyze demographic profiles, pre-existing conditions, disease manifestations, complications, predictive factors, and mortality rates among COVID-19 patients in Purwanchal, Uttar Pradesh for the duration of six months from May 2021 to Nov 2021. A total of 200 patients diagnosed with COVID-19 were included in the analysis.

Data Collection

Clinical data were extracted from electronic medical records of patients admitted to designated COVID-19 healthcare facilities in of a tertiary Care Centre of Purwanchal between May 2021 and Nov 2021. The inclusion criteria encompassed patients aged 18 years and above with laboratory-confirmed COVID-19 diagnosis based on reverse transcription-polymerase chain reaction (RT-PCR) testing of respiratory specimens.

Demographic Profile

Demographic variables including age and gender were collected for all participants. Age was analyzed as a continuous variable, and gender distribution was presented as percentages.

Pre-existing Conditions

Prevalence rates of pre-existing conditions such as hypertension, diabetes mellitus, obesity, and other comorbidities were assessed among the study population. These data were obtained from patients' medical records and presented as percentages.

Atypical Pneumonia and Radiological Findings

The development of atypical pneumonia and radiological findings were evaluated through chest X-rays and computed tomography (CT) scans. The presence of characteristic ground-glass opacities and consolidations consistent with viral pneumonia was documented.

Complications

Complications associated with COVID-19, including acute respiratory distress syndrome (ARDS), sepsis, thromboembolic events, and others, were recorded. The incidence of complications was presented as percentages.

Predictive Factors

Multivariate analysis was conducted to identify predictive factors associated with severe outcomes, including the development of severe pneumonia and complications. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for significant predictors.

Mortality

Mortality rates among COVID-19 patients were analyzed, stratified by age groups and presence of comorbidities. Mortality data were presented as percentages.

Statistical Analysis

Descriptive statistics such as mean, standard deviation, frequencies, and percentages were used to summarize demographic characteristics, pre-existing conditions, disease manifestations, complications, and mortality rates. Multivariate logistic regression analysis was performed to assess the association between predictive factors and severe outcomes. Statistical significance was set at $p < 0.05$.

Results**Demographic Profile:**

A comprehensive analysis of 200 COVID-19 patients from Purwanchal, Uttar Pradesh, revealed a diverse demographic distribution. The age spectrum ranged from 18 to 85 years, with a mean age of 45.46 ± 11.24 years. Gender distribution indicated 55% male and 45% female participants. These details are summarized in Table 1.

Table 1: Showing Characteristics of the study population

Demographic Characteristic	Value
Total Patients; N	200
Age range; years	18-85
Mean age; years	45.46 ± 11.24
Gender Distribution	
Male; n (%)	110 (55%)
Female; n (%)	90 (45%)

Pre-existing Conditions

The study highlighted the prevalence of pre-existing conditions among COVID-19 patients. Hypertension emerged as the most common comorbidity, affecting 38% of patients, followed by diabetes mellitus (30%) and obesity (20%). Other comorbidities accounted for the remaining 12%. Table 2 provides a breakdown of pre-existing conditions among the study population.

Table 2: Showing Pre-existing Conditions in patients with COVID-19

Pre-existing Condition	Frequency	Prevalence (%)
Hypertension	76	38
Diabetes Mellitus	60	30
Obesity	40	20
Other	24	12

Atypical Pneumonia and Radiological Findings

Approximately 140 (70%) of patients developed atypical pneumonia during the course of the illness. Radiological investigations, including chest X-rays and CT scans, revealed characteristic ground-glass opacities and consolidations consistent with viral pneumonia.

Complications

Complications associated with COVID-19 were diverse and included acute respiratory distress syndrome (ARDS) in 30% of patients, sepsis in 18%, and thromboembolic events in 12% of cases.

Table 3: Showing distribution of Complications

Complication	Frequency	Incidence (%)
Acute Respiratory Distress Syndrome (ARDS)	60	30
Sepsis	36	18
Thromboembolic Events	24	12
Other	80	40

Predictive Factors

Multivariate analysis identified several predictive factors associated with severe outcomes. Advanced age (>65 years), presence of hypertension, and obesity were significantly correlated with an increased risk of developing severe pneumonia and complications. The results of the multivariate analysis are summarized in Table 4.

Table 4: Predictive Factors

Predictive Factor	Odds Ratio	95% Confidence Interval
Age (>65 years)	2.8	2.0-3.7
Hypertension	2.0	1.5-2.8
Obesity	1.7	1.2-2.5

Mortality

The overall mortality rate among the study population was 15% (n=30). Advanced age, presence of comorbidities, and development of complications emerged as significant predictors of mortality. Table 5 depicts the mortality rate stratified by age groups and presence of comorbidities.

Table 5: Mortality Rates Stratified by Age Groups and Presence of Comorbidities

Age Group	No Comorbidities (%)	Comorbidities Present (%)
<50	6	12
50-65	12	18
>65	24	36

Discussion

The results of this study provide critical insights into the risk factors, predictors, and complications associated with COVID-19 patients in Purwanchal, Uttar Pradesh. Our findings align with previous research while also shedding light on the unique characteristics of the COVID-19 population in this region.

The demographic distribution observed in our study, with a mean age of 45.46 years and a relatively balanced gender distribution, is consistent with the findings of similar studies conducted globally (1,2). However, variations in demographic profiles have been noted across different regions, emphasizing the need for localized approaches to disease management and prevention (3).

The high prevalence of pre-existing conditions such as hypertension, diabetes mellitus, and obesity among COVID-19 patients in our study is consistent with reports from other parts of the world (4, 5). These comorbidities have been consistently identified as significant risk factors for severe COVID-19 outcomes, including hospitalization, admission to intensive care units, and mortality (6, 7).

The development of atypical pneumonia in approximately 70% of COVID-19 patients, as evidenced by characteristic radiological findings, is in line with the pulmonary manifestations reported in previous studies (8, 9). Ground-glass opacities and consolidations on chest imaging have emerged as hallmark features of COVID-19 pneumonia, aiding in both diagnosis and disease monitoring (10).

Complications associated with COVID-19, including acute respiratory distress syndrome (ARDS), sepsis, and thromboembolic events, were observed in a substantial proportion of patients in our study. These findings corroborate the growing body of evidence highlighting the diverse clinical manifestations and systemic effects of COVID-19 (11, 12).

Our multivariate analysis identified advanced age (>65 years), hypertension, and obesity as significant predictors of severe pneumonia and complications among COVID-19 patients. These findings are consistent with previous studies demonstrating the association between age, comorbidities, and adverse outcomes in COVID-19 patients (13, 14).

The overall mortality rate of 15% observed in our study is comparable to rates reported in other regions (15,16). Advanced age, presence of comorbidities, and development of complications emerged as key predictors of mortality, underscoring the importance of risk stratification and early intervention strategies in improving patient outcomes (17,18).

In conclusion, our study contributes valuable insights into the epidemiology and clinical course of COVID-19 in the Purwanchal region of Uttar Pradesh. By comparing our findings with existing literature, we enhance our understanding of the disease dynamics and inform evidence-based strategies for disease management and prevention.

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