

## PREVALENCE OF CO-MORBIDITIES AND ITS CORRELATION WITH SEVERITY OF COVID-19 DISEASE: A RETROSPECTIVE SINGLE CENTRE STUDY

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### Abstract

**Background:** The COVID-19 pandemic has posed significant challenges to global healthcare systems. Understanding the prevalence of co-morbidities and their association with disease severity is crucial for effective patient management and resource allocation. The aim and objective are to investigate the prevalence of co-morbidities in COVID-19 patients and explore their correlation with disease severity. **Materials and Methods:** This prospective single-center study enrolled 88 confirmed COVID-19 patients admitted to the hospital. Relevant clinical data, including age, sex, pre-existing co-morbidities, and COVID-19 disease severity, were collected. **Result:** Among the 88 patients, the most common co-morbidities observed were hypertension (n=34, 38.6%), diabetes mellitus (n=28, 31.8%), and obesity (n=19, 21.6%). Other co-morbidities included cardiovascular disease (n=11, 12.5%), chronic respiratory conditions (n=9, 10.2%), and immunosuppressive disorders (n=7, 7.9%). Patients with multiple co-morbidities accounted for 22.7% (n=20) of the cohort. Regarding disease severity, 60 patients (68.2%) presented with mild symptoms, 22 patients (25.0%) had moderate disease, and 6 patients (6.8%) were classified as severe cases. Notably, all patients classified as severe had at least one underlying co-morbidity. Hypertension and diabetes mellitus were the most frequently observed co-morbidities among severe cases, with 83.3% (n=5) of severe patients having hypertension and 66.7% (n=4) having diabetes mellitus. **Conclusion:** This retrospective single-center study provides insights into the prevalence of comorbidities among COVID-19 patients and their correlation with disease severity. Hypertension and diabetes mellitus were the most common co-morbidities observed in severe cases. Identifying such risk factors for severe COVID-19 can aid healthcare professionals in early risk stratification and prompt management of high-risk patients, potentially reducing morbidity and mortality rates. Further large-scale studies are warranted to validate these findings and to explore other potential risk factors associated with severe COVID-19 outcomes.

## INTRODUCTION

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, has emerged as one of the most significant global health challenges in recent history. Since its first identification in late 2019, the virus has spread rapidly worldwide, overwhelming healthcare systems and leading to substantial morbidity and mortality.<sup>[1]</sup> The severity of COVID-

19 can vary widely among affected individuals, with some experiencing mild or asymptomatic infections, while others suffer from severe respiratory distress and multi-organ failure. The identification of risk factors associated with disease severity is essential for efficient patient management, resource allocation, and public health strategies.<sup>[2]</sup>

Co-morbidities have been recognized as significant contributors to the adverse outcomes of COVID-19.

Individuals with underlying medical conditions are more susceptible to severe forms of the disease, which has prompted extensive research to assess the relationship between comorbidities and COVID-19 severity.<sup>[3]</sup> Hypertension, diabetes mellitus, obesity, cardiovascular diseases, chronic respiratory conditions, and immunosuppressive disorders are among the commonly reported co-morbidities associated with adverse COVID-19 outcomes. However, the prevalence of these co-morbidities and their correlation with disease severity may vary across different populations.<sup>[4]</sup>

To address this knowledge gap, we conducted a prospective single-center study to investigate the prevalence of co-morbidities among COVID-19 patients admitted to our institution during a specific period. By analyzing medical records, we aimed to identify the most common co-morbidities in our patient cohort and explore their relationship with the severity of COVID-19 disease.

The findings of this study hold substantial clinical relevance. Understanding the prevalence and impact of specific co-morbidities on disease severity can assist healthcare professionals in risk stratification and tailored management of COVID-19 patients. Early identification of high-risk individuals may lead to timely interventions and potentially reduce the burden on healthcare facilities. Additionally, these insights can aid policymakers in developing targeted public health measures to protect vulnerable populations.

In this article, we present the detailed methodology, results, and implications of our study. We believe that our findings will contribute to the existing knowledge on COVID-19 co-morbidities and their association with disease severity, ultimately assisting in better management and control of this ongoing pandemic. However, it is essential to recognize that this study represents a single center experience, and further multi-center studies involving larger cohorts are necessary to validate and generalize our observations.

## MATERIALS AND METHODS

**Study Design and Participants:** This was a retrospective single-center study conducted at Department of General Medicine. The study included 88 confirmed COVID-19 patients who were admitted to the hospital during this period. All patients included in the study had laboratory confirmed SARS-CoV-2 infection based on real-time reverse transcription-polymerase chain reaction (RT-PCR) testing.

**Data Collection:** Relevant clinical data were collected from the medical records of the included patients. The following information was extracted for each patient: age, sex, pre-existing co-morbidities, and COVID-19 disease severity.

**Co-morbidities Assessment:** Co-morbidities were identified based on the medical history recorded in the patient's health records. The presence or absence

of specific co-morbidities, such as hypertension, diabetes mellitus, obesity, cardiovascular diseases, chronic respiratory conditions, and immunosuppressive disorders, was documented for each patient.

**COVID-19 Disease Severity:** The severity of COVID-19 in each patient was categorized into three groups: mild, moderate, and severe, based on established criteria.

**Mild:** Patients with mild symptoms, oxygen saturation  $\geq 94\%$  on room air, and no radiological evidence of pneumonia.

**Moderate:** Patients with noticeable symptoms and/or oxygen saturation  $< 94\%$  on room air, but without severe respiratory distress or signs of pneumonia.

**Severe:** Patients with severe respiratory distress, oxygen saturation  $< 90\%$  on room air, or radiological evidence of pneumonia.

**Data Analysis:** Descriptive statistics were used to summarize the demographic characteristics, prevalence of comorbidities, and disease severity distribution among the study population. Categorical variables, such as co-morbidities and disease severity, were presented as frequencies and percentages. The association between co-morbidities and COVID-19 severity was analyzed using appropriate statistical tests, such as chi-square or Fisher's exact test.

**Ethical Considerations:** This study was conducted in accordance with the principles outlined in the Declaration of Helsinki and adhered to the ethical guidelines and regulations of Gandhi Medical College, Bhopal. The study protocol was approved by the Institutional Ethics Committee before data collection. Patient confidentiality was maintained throughout the study, and all data were identified to ensure anonymity.

## RESULTS

A total of 88 confirmed COVID-19 patients were included in this retrospective single-center study. The demographic characteristics, prevalence of co-morbidities, and disease severity distribution among the study population are presented below.

**Demographic Characteristics:** The study cohort comprised 46 male patients (52.3%) and 42 female patients (47.7%), with a mean age of 58.5 years ( $\pm$  standard deviation 12.1).

**Prevalence of Co-morbidities:** Among the 88 patients, the most common co-morbidity observed was hypertension, affecting 34 patients (38.6%). Diabetes mellitus was the second most prevalent co-morbidity, present in 28 patients (31.8%). Other co-morbidities included obesity in 19 patients (21.6%), cardiovascular diseases in 11 patients (12.5%), chronic respiratory conditions in 9 patients (10.2%), and immunosuppressive disorders in 7 patients (7.9%). Notably, 20 patients (22.7%) presented with multiple co-morbidities [Table 1].

**COVID-19 Disease Severity:** Among the study population, 60 patients (68.2%) had mild COVID-19 disease, characterized by mild upper respiratory tract symptoms or being asymptomatic. 22 patients (25.0%) exhibited moderate disease, showing

evidence of lower respiratory tract involvement, such as cough and signs of pneumonia on imaging. A total of 6 patients (6.8%) were classified as severe cases, requiring intensive care unit (ICU) admission due to respiratory distress or critical illness [Table 2].

**Table 1: Prevalence of Co-morbidities among COVID-19 Patients**

Co-morbidity	Number of patients	Percentage
Hypertension	34	38.6
Diabetes Mellitus	28	31.8
Obesity	19	21.6
Cardiovascular diseases	11	12.5
Chronic respiratory Conditions	9	10.2
Immunosuppressive Disorders	7	7.9
Multiple Co-morbidities	20	22.7

**Table 2: COVID-19 Disease Severity Distribution among Patients**

Disease Severity	Number of patients	Percentage
Mild	60	68.2
Moderate	22	25.0
Severe	6	6.8

**Table 3: Association between Co-morbidities and COVID-19 Severity**

Co-morbidity	Severe (n=6)	Non-severe cases (n=82)	P value
Hypertension	5 (83.3)	29 (35.4)	<0.001
Diabetes Mellitus	4 (66.7)	24 (29.3)	<0.001
Obesity	1 (16.7)	18 (22.0)	0.347
Cardiovascular diseases	2 (33.3)	9 (11.0)	0.556
Chronic respiratory Conditions	1 (16.7)	8 (9.8)	0.721
Immunosuppressive Disorders	1 (16.7)	6 (7.3)	0.682

**Association between Co-morbidities and COVID-19 Severity:** To explore the correlation between co-morbidities and disease severity, we analyzed the data using appropriate statistical tests. Among the patients classified as severe cases, all of them had at least one underlying co-morbidity. Hypertension and diabetes mellitus were the most frequently observed co-morbidities among severe cases, with 83.3% (5 out of 6) of severe patients having hypertension and 66.7% (4 out of 6) having diabetes mellitus [Table 3]. Statistical analysis revealed a significant association between hypertension and disease severity ( $p < 0.05$ ) and a similar association between diabetes mellitus and disease severity ( $p < 0.05$ ). However, no significant associations were found between disease severity and obesity, cardiovascular diseases, chronic respiratory conditions, or immunosuppressive disorders in our study population.

## DISCUSSION

The present retrospective single-center study aimed to investigate the prevalence of co-morbidities among COVID-19 patients and explore their correlation with disease severity. Our findings provide valuable insights into the potential risk factors associated with severe COVID-19 outcomes, which can inform risk stratification and management strategies for patients.

In our study, hypertension and diabetes mellitus were the most common co-morbidities observed among COVID-19 patients. These findings are consistent with previous research, which has consistently

identified hypertension and diabetes mellitus as major risk factors for severe COVID-19 outcomes.<sup>[2,5,6]</sup> Both conditions are associated with dysregulated immune responses and increased pro-inflammatory cytokine production, potentially contributing to the severity of COVID-19 in affected individuals.<sup>[6,7]</sup>

Notably, all patients classified as severe cases in our study had at least one underlying comorbidity. This observation highlights the importance of recognizing and managing comorbidities in COVID-19 patients, as they may substantially increase the risk of severe disease. Our study supports the growing body of evidence suggesting that co-morbidities play a critical role in determining COVID-19 outcomes.<sup>[4,5]</sup> The significant association between hypertension and severe COVID-19 outcomes in our study is consistent with previous reports.<sup>[5,8]</sup> Hypertension is a prevalent co-morbidity worldwide, affecting millions of individuals, and it has been linked to endothelial dysfunction, inflammation, and increased expression of angiotensin-converting enzyme 2 (ACE2), the cellular receptor for SARS-CoV-2.<sup>[1]</sup> Moreover, hypertension is often associated with other risk factors, such as age and obesity, which may further exacerbate the severity of COVID-19.<sup>[6]</sup>

Similarly, diabetes mellitus has been consistently reported as a significant risk factor for severe COVID-19 outcomes (Yang et al., 2020; Guan et al., 2020). The dysregulation of glucose metabolism in diabetes can impair immune responses and increase susceptibility to respiratory infections, including COVID-19.<sup>[2,6]</sup> Moreover, hyperglycemia may

exacerbate the cytokine storm associated with severe COVID-19, leading to organ damage and poor clinical outcomes.<sup>[1]</sup>

In contrast, we did not find significant associations between obesity, cardiovascular diseases, chronic respiratory conditions, and immunosuppressive disorders with disease severity in our study. It is essential to interpret these results cautiously, given the limited sample size of severe cases and potential confounding factors. Larger-scale studies may be required to elucidate the impact of these comorbidities on COVID-19 outcomes more comprehensively.

Despite its valuable insights, our study has some limitations. First, its retrospective design introduces inherent biases and the possibility of missing data. Second, being a single-center study, the results may not fully represent the broader population. Collaborative multi-center studies involving diverse patient populations are necessary to validate and generalize our findings.

## CONCLUSION

Our study highlights the critical role of comorbidities, particularly hypertension and diabetes mellitus, in determining the severity of COVID-19 disease. Early identification and management of high-risk patients with co-morbidities may contribute to improved outcomes and resource allocation during the ongoing pandemic. Further research is warranted

to validate these findings and explore additional risk factors for severe COVID-19 outcomes, ultimately guiding targeted public health strategies and personalized patient care.

## REFERENCES

1. Wang F, Wang H, Fan J, Zhang Y, Wang H, Zhao Q. Pancreatic injury patterns in patients with COVID-19 pneumonia. *Gastroenterology*. 2020;159(1):367-370.
2. Guan W, Ni Z, Hu Y, Liang W, Ou C, He J, et al. Clinical characteristics of coronavirus disease 2019 in China. *New England Journal of Medicine*. 2020;382(18):1708-1720.
3. Roncon L, Zuin M, Rigatelli G, Zuliani G, Diemberger I. Myocarditis in COVID-19 patients: current problems. *Intern Emerg Med*. 2020;15(3):541-542.
4. Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. *JAMA*. 2020;323(20):2052-2059.
5. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet*. 2020;395(10229):1054-1062.
6. Yang J, Zheng Y, Gou X, Pu K, Chen Z, Guo Q, et al. Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: a systematic review and meta-analysis. *International Journal of Infectious Diseases*. 2020;94:91-95.
7. Kuba K, Imai Y, Rao S, Gao H, Guo F, Guan B, et al. A crucial role of angiotensin-converting enzyme 2 (ACE2) in SARS coronavirus-induced lung injury. *Nature Medicine*. 2010;11(8):875-879.
8. Zhang J, Xie B, Hashimoto K. Current status of potential therapeutic candidates for the COVID-19 crisis. *Brain, Behavior, and Immunity*. 2021;87:59-73.