

Research Article

Impact of Sarcoidosis on Outcomes of Hospitalized COVID-19 Patients: A Nationwide Retrospective Cohort Study

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Abstract

Background

The COVID-19 pandemic has been a global health crisis that has resulted in significant morbidity and mortality worldwide. Sarcoidosis, a chronic inflammatory disease, may potentially affect the course and outcomes of COVID-19 patients. This study aims to evaluate the impact of sarcoidosis on the outcomes of hospitalized COVID-19 patients.

Methods

This retrospective cohort study utilized the Nationwide Inpatient Sample database to identify adult patients with a principal diagnosis of COVID-19 who were hospitalized in 2020.

Patients with secondary sarcoidosis diagnosis were compared to those without sarcoidosis. Patient characteristics, comorbidities, and outcomes were analyzed. Univariable and multivariable logistic regression analyses were used to calculate odds ratios and adjust for confounding variables.

Results

A total of 1,050,720 adults were discharged with a primary COVID-19 diagnosis in 2020, with 3485 patients having a secondary sarcoidosis diagnosis. Patients with sarcoidosis were more likely to be male, younger, and had lower comorbidities at baseline compared to patients without sarcoidosis. After adjusting for confounding variables, the odds of mortality in patients with sarcoidosis were not

statistically significant (OR 1.003 {95% CI 0.753-1.335} p=0.982). The intubation rate was lower in the sarcoid group (0.35%) compared to the non-sarcoid group (1.3%), but this difference was not statistically significant. There was no significant difference in length of stay between the two groups.

Conclusion

This study suggests that sarcoidosis does not significantly affect the mortality, intubation rate, or length of stay in hospitalized COVID-19 patients. Further studies are needed to explore the potential impact of sarcoidosis on COVID-19 outcomes.

Keywords: COVID-19; Clinical outcomes; Patients; Sarcoidosis

Introduction

The COVID-19 pandemic has led to an unprecedented global health crisis, with significant mortality and morbidity rates reported worldwide. While several studies have investigated the impact of comorbidities on the clinical outcomes of COVID-19 patients, the association between sarcoidosis and COVID-19 outcomes remains unclear. In this study, we aimed to investigate the association between sarcoidosis and clinical outcomes of COVID-19 patients in the US, and compare our findings with previous studies that investigated the impact of comorbidities on COVID-19 outcomes. Our results suggest that patients with sarcoidosis as a comorbidity may not have significantly different clinical outcomes compared to COVID-19 patients without sarcoidosis. However, our findings are consistent with some previous studies, while conflicting with others, highlighting the need for further research to better understand the relationship between sarcoidosis and COVID-19 outcomes. This study contributes to the growing body of knowledge on the impact of comorbidities on the clinical outcomes of COVID-19 patients, and provide valuable insights for healthcare professionals managing COVID-19 patients with sarcoidosis.

Study design and date description

This is a retrospective cohort study of adult patients hospitalized in 2020 with COVID-19 infection in hospitals across United States. Patients were selected from nationwide inpatient sample (NIS) database. Which is part of a family of databases and software tools developed for the Healthcare Cost and Utilization Project (HCUP). The NIS is the largest publicly available all-payer inpatient healthcare database designed to produce U.S. regional and national estimates of inpatient utilization, access, cost, quality, and outcomes. Unweighted, it contains data from around 7 million hospital stays each year. Weighted, it estimates around 35 million hospitalizations nationally. Using International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System (ICD-10-CM/PCS) [1].

Study patients

Patients with principal ICD-10-CM diagnosis of COVID-19 were included in the study. Starting from April 2020 ICD added a new diagnosis of COVID-19. Patients were excluded if they were younger

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than 18 years of age. Our patient sample was divided into two groups: patients who carry sarcoidosis as a secondary diagnosis compared to those without. Each patient group were characterized for sex, age, race, patient's comorbidities (Deo adaptation of the Charlson Comorbidity Index for administrative data), hospital region, and primary payer. Each sarcoidosis subgroup was characterized by the same variables.

Out comes

The primary outcome was comparing mortality during hospitalization between both groups, mortality variable was provided within the NIS for each discharge. Mortality of each subgroup was compared with covid patients who do not have the 2ndary diagnosis of that specific subgroup. Secondary outcomes were the need for intubation; length of hospital stay and total hospitalization charges. We used ICD-10- PCS to isolate patients who required intubation during hospital stay. Length of hospital stay, and total hospitalization charges were provided within the NIS for each hospitalization.

Statistical analysis

Analysis was performed by using STATA, version 17.0 - Standard Edition. Univariable logistic regression analysis was used to calculate unadjusted odds ratios (ORs) for the primary and secondary outcomes. Multivariable logistic regression analysis was used to adjust for sex, age and patient comorbidities for the primary outcome. Proportions were compared by using the Chi-squared test, and continuous variables were compared by using the student t test. All P values were 2 sided, with .05 as the threshold for statistical significance.

Results

Patient characteristics

Total number of adults who were discharged with COVID-19 as a primary ICD-10-CM diagnosis was 1,050,720. Out of those 3485 patients have secondary ICD-10-CM diagnosis of sarcoidosis. For patients who were discharged with COVID-19, those who have history of sarcoid were more likely to be Male 52.9% vs 47.2%, Mean age for female with sarcoid was lower compared to covid patient without sarcoid 62.9 vs 65.7. The sarcoidosis group has lower comorbidities at baseline compared to patients without sarcoidosis as implicated by the CCI score. Medicare was the most common primary payer for sarcoid group (53.8). When looking at patient characteristics in subgroups, the proportion COVID patient with sarcoid was the highest among blacks 51.6 vs 39.4. The proportion of Hispanic population was significantly higher on covid without sarcoidosis subgroup 20.6 compared with sarcoid group 4.7. Patient treated in Midwest hospital has the highest patient population with sarcoidosis 30.9 followed by northeast and then south 21 and 12.2% respectively. (Table 1).

Variable	Covid without sarcoidosis	Covid with sarcoidosis
N=1050720	1047235	3485
Female%	47.2	61.1
Male	52.9	38.9
Mean age, years		
Female	65.7	62.9
Male	63.9	61.6
Race		

White	52.7	39.4
Black	18.4	51.6
Hispanic	20.6	4.7
Asian or pacific islanders	3.2	0.7
Native American	1.1	0.2
Others	4.1	3.4
CCI score%		
1	27.9	25.8
2	16.3	21.5
>=3	28.0	32.7
Hospital region		
Northeast	17.7	21
Midwest	23.3	30.9
South	41.8	12.2
East	17.2	6.0
Primary payer		
Medicare	55.0	53.8
Medicaid	12.2	10.3
Private insurance	29.1	34.5
Others	3.6	1.5

Table 1: Patient characteristics, comorbidities and hospital regions.

Primary outcome

The total in-hospital mortality rate for patient admitted with COVID-19 was 11.1% in 2020. Total number of COVID-19 patients who died during hospitalization was 117,315 (11.1%) in 2020 over the US 0.27% of those had history of sarcoidosis (315).

Among patients who were admitted with COVID-19, patient who have history of Sarcoid have 21% decrease in odds of mortality (OR 0.79 {95% CI 0.593-1.05 p=0.105}) compared to those who do not have, this result is not statistically significant before adjusting for possible confounders.

Upon running multivariate logistic regression and adjusting for confounding variables, the odds of mortality in patients with sarcoidosis increase to 0.3% (OR 1.003 {95% CI 0.753-1.335} p=0.982) but still remained insignificant.

Secondary outcome

Intubation

Intubation rate was 8.5% in total covid admission 2020. The sarcoid group had a 0.35% intubation rate compared to the non-sarcoid group (1.3%). This was not statistically significant even after adjusting for confounder including age, gender and CCI score.

Length of stay

For Covid patients who have sarcoidosis and compared to those without sarcoidosis after adjusting for confounders there was no significant difference in length of stay between the two groups (OR 0.657 {95% CI 0.37-1.16} P=0.148) after adjusting for variables.

Discussion

The study aimed to investigate the association between the history of sarcoidosis and clinical outcomes of COVID-19 patients in the US.

Several studies have reported that comorbidities such as hypertension, diabetes, and cardiovascular diseases are associated with increased mortality and morbidity among COVID-19 patients [1-3]. The findings of this study suggest that patients with sarcoidosis as a comorbidity have a lower odds ratio of mortality compared to COVID-19 patients without sarcoidosis, but the result was not statistically significant after adjusting for confounding variables. This finding is consistent with some previous studies that reported no significant association between sarcoidosis and COVID-19 outcomes [4, 5]. On the other hand, some studies have reported conflicting results regarding the impact of sarcoidosis on COVID-19 outcomes. For example, a study conducted in Spain reported that sarcoidosis was associated with a higher risk of mortality among COVID-19 patients [6]. Another study conducted in Italy reported that sarcoidosis was associated with a higher risk of hospitalization and intensive care unit (ICU) admission [7].

Regarding the need for intubation, the current study reported that patients with sarcoidosis had a lower rate of intubation compared to COVID-19 patients without sarcoidosis, but the result was not statistically significant after adjusting for confounders. In contrast, a study conducted in China reported that patients with underlying respiratory diseases, including sarcoidosis, had a higher risk of respiratory failure and need for mechanical ventilation [8].

In terms of hospital length of stay, the current study reported no significant difference in length of stay between COVID-19 patients with and without sarcoidosis after adjusting for confounders. This finding is consistent with some previous studies that reported no significant association between sarcoidosis and hospital length of stay [9, 10].

It is worth noting that the current study has several limitations, including its retrospective design, reliance on administrative data, and inability to assess the severity of sarcoidosis and COVID-19. Moreover, the study did not investigate the impact of treatment on the clinical outcomes of COVID-19 patients with sarcoidosis.

In conclusion, the current study suggests that sarcoidosis as a comorbidity may not significantly impact the clinical outcomes of COVID-19 patients in the US. However, the findings of previous

studies have been conflicting, highlighting the need for further research to better understand the relationship between sarcoidosis and COVID-19 outcomes.

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