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SARS CoV-2 Mortality and Co-Morbidities a Narrative Review

Mahmood Jan[1], Muhammad Ilyas[2], Mohsin Ahmad Khan[3], Syed Imad Ali Shah[4], Muhammad Yahya Fazal[5], Muhammad Afzal[6], Amjad Khan[7]

Original Article

ARTICLE INFORMATION

Corresponding Author:

- **email**

Affiliations:

1. Therapy Khyber Medical University Peshawar.
2. Respiratory Therapist in Buch International Multan.
3. Respiratory Therapist in SKMCH&RC Peshawar.
4. Respiratory Therapist in Fuji foundation hospital Peshawar
5. Respiratory Therapist in MMC Peshawar.
6. Respiratory Therapist in Al-Hadi Shehryar Health and care Centre Peshawar.
7. Technologist in DHQ Hospital Mardan.

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ABSTRACT

Bbackground: Patients with SARS-CoV-2 who present with pre-existing co-morbidities have a significantly higher risk of mortality and ICU admission, as emphasized by the World Health Organization (WHO). Identifying and understanding these co-morbidities are essential for improving patient outcomes.

Objective: To assess the association between pre-existing co-morbidities and SARS-CoV-2 mortality, To determine which co-morbidities pose the highest risk.

Methods: A structured search strategy was employed using PRISMA guidelines. PubMed and Google Scholar were searched for studies published between 2019 and 2021. Keywords included "COVID-19 mortality," "SARS-CoV-2 co-morbidities," "hypertension and COVID-19," "diabetes and SARS-CoV-2 mortality," and similar terms. Eligible studies included systematic reviews, retrospective analyses, and cohort studies. Study selection was based on predefined inclusion and exclusion criteria to ensure relevance and reproducibility. The extracted data were analysed through SPSS version 22 and apply descriptive statistics including frequency and percentage.

Results: A total of 10,991 confirmed COVID-19 mortality cases were analysed across nine studies. Obesities [total patients TP=354, death rate DR=260 (73.4%)], Hypertension [TP=4094, DR=1250(30.5%)], asthma [TP=83, DR=25(30.1%)], CKD [TP=746, DR=224, (30%)], CVD [TP=670, DR=195(29.1%)], diabetes [TP= 2180, DR= 567(26%)], Heart failure [TP=831, DR=156 (18.7%)], Cancer [TP=329, DR=33 (10%)], COPD [TP=994, DR=94 (9.4%)], HIV [TP=11, DR=1 (9%)], CAD[TP=56, DR=5 (8.92%)] and liver disease [TP=643, DR=56 (8.7%)]. Mortality variations were observed across different demographics, healthcare systems, and genetic predispositions.

Conclusion: Patients with Obesities, Hypertension, Asthma, CKD, CVD, Diabetes, Heart failure, Cancer, COPD, HIV, CAD and liver disease exhibit the highest mortality risk from SARS-CoV-2. Strengthening infection prevention and treatment strategies tailored to high-risk populations may significantly improve survival rates.

Introduction:

A newly identified sever acute respiratory syndrome corona virus 2 (SARS CoV 2) has outbreak in December 2019 from Wuhan, China and spread rapidly throughout the world.(1,2) As of the 15th of June 2021, a total of 183,794,396 SARS CoV 2 cases and 3,977,121 deaths were reported in 187 countries and six continents across the globe. According to WHO most of the cases are reported in United States (33,723,095), India (30,585,229), Brazil (18,792,511), France (5,718,270) and Russia (5,568,104). But in Pakistan this rate is 964,490 and total deaths are 22,452. Now there is effective vaccine are for SARS CoV 2 and there is no antiviral medication for SARS CoV 2. The SARS CoV 2 mortality rate is different among the countries and region at level of globe, to reduce the all over global mortality rate and to figured out the risk factors related with severity of the disease and poor results among the SARS CoV 2 patients is required.(3) As from research articles that risk factors for SARS CoV 2 mortality progressively increase, it is obvious that a person with existing co-morbidities like Hypertension, Diabetes, Chronic Kidney Disease (CKD), Chronic Liver Disease, Heart failure, Asthma, Cancer, HIV, Coronary Artery Disease (CAD), chronic obstructive pulmonary diseases (COPD) and Cerebrovascular Disease(CVD) might have a greater risk of mortality from SARS CoV 2. As the number of researches increase, some researches shows association between existing co-morbidities and SARS CoV 2 mortality while some researches do not show any association between existing co-morbidities and SARS CoV 2 mortality. From the articles it is understandable that the greater mortality rate, like in Unites States, China and Europe have the greater burden of these conditions.(4) The corona virus is the causative agent of SARS CoV 2, to combine with angiotensin converting enzyme 2 (ACE 2), a cellular combining site in, heart, kidney and pulmonary alveolar type 2 cells. It has been suppose that existing use of angiotensin-ll type-1 receptor blockers (ARBs) may regulate membrane bounding ACE ll increasing vulnerability to virus to enter in human. It is probable that a person with existing chronic

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condition like as heart failure and hypertension taking angiotensin ll type 1 receptor blockers might be more vulnerable to the severity of SARS CoV 2, including mortality.(5)

The SARS CoV 2 patients who appear with existing co-morbidities may have a greater chance of decline and require admission in the ICU for close monitoring according to the World Health Organization guideline for well management. The ability to assess the risk factors fuse with bad prognosis among SARS CoV 2 infected patients is important for early procedures in order to strengthen these patients treatment .Previous researches reported an increase chance of developing severe complications in SARS CoV 2 patients with existing disease.(3)

To study the articles have investigate the relationship of a existing co-morbidities and SARS CoV 2 mortality have extent in many countries and region. The number of studies included and many conditions identified. Those researches, which have major uncontended sources of affinity that reduce results withdraw from them. We took a complete approach and calculate the relationship of major existing co-morbidities, including Obesities, Hypertension, Asthma, CKD, CVD, Diabetes, Heart failure, Cancer, COPD, HIV, CAD and liver disease and the risk of mortality from SARS CoV 2. Most of the researches performed in United States, China, Korea, Europe, Africa and Spain. We are conducting a systemic review to further elaborate co-morbidities which cause mortality among SARS CoV 2 patients and further strengthen the evidence that mortality of SARS CoV 2 patients increase with co-morbidities.

Table 1 Global confirm cases of COVID-19

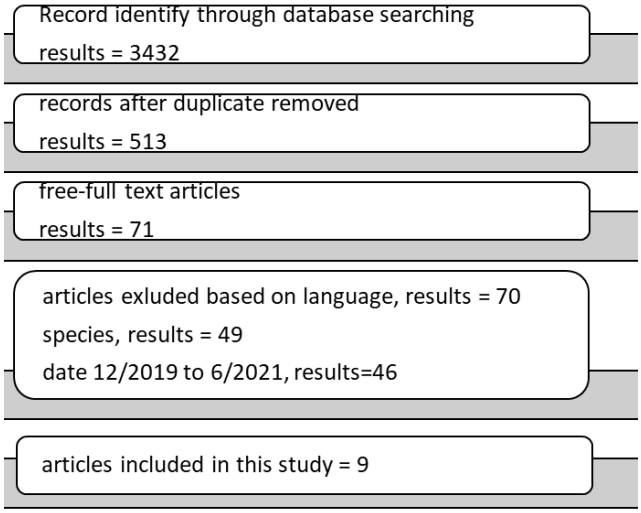
Serial #	Country Name	CASES
1	United state	33,723095
2	India	30,585,220
3	Brazil	18,792,511
4	France	5,718,270
5	Russia	5,568,104
6	Pakistan	964,490

Table 1 Global confirm cases of COVID-19 are 183,794,396

METHODS:

A structured search strategy was employed using PRISMA guidelines. PubMed and Google Scholar were searched for studies published between 2019 and 2021. Keywords included "COVID-19 mortality," "SARS-CoV-2 co-morbidities," "hypertension and COVID-19," "diabetes and SARS-CoV-2 mortality," and similar terms. A total of 3,432 studies were identified through database searching. After removing duplicates, 513 studies remained. Following a screening process, 71 studies met the full-text eligibility criteria. After further exclusion based on language (70 studies), species (49 studies), and publication date (46 studies), 9 studies were included in this review. These studies encompassed different methodologies: 2 systematic reviews, 4 retrospective studies, and 3 cohort studies, conducted across 6 countries (United States, China, Spain, Italy, Korea, and the United Kingdom). The selected studies covered data published between 2019 and 2021. The extracted data were analysed through SPSS version 22 and apply descriptive statistics including frequency and percentage.

Figure 1 selection criteria



Eligibility criteria

Researches are selected according to the following eligibility criteria: Study design, participants, condition, exposure, comparison and context.

1. **Participants :**

We included researches which include in patients which hospitalized for SARS-CoV-2, without limitation of age.

2. Exposure: They included any of the twelve co morbidities including coronary artery diseases, hypertension, diabetes, heart failure, cerebrovascular disease, chronic kidney disease, liver disease, cancer, chronic obstructive pulmonary disease, asthma, obesities and HIV.

3. Comparison: We compare these twelve co morbidities with each other in which obesity had greater mortality compare to others co morbidities.

4. Condition: The primary condition was the mortality in hospitalized patients with SARS-CoV-2 with co morbidities and those SARS-CoV-2 hospitalized patients without comorbidities.

RESULTS:

The analysis of the studies revealed variations in SARS-CoV-2 mortality based on different co-morbidities.

The rate of mortality in obesity patients in SARS CoV 2

Two researches are reported that obesity cause mortality in SARS CoV 2 patients. The TP of obesity is 354 and DR is 260 (73.4%).

The rate of mortality in hypertension patients in SARS CoV 2

The total of nine researches are reported that hypertension is a greater comorbidity of mortality in SARS CoV 2 patients. The TP of hypertension with SARS CoV 2 is 4094 and DR is 1250 (30.5%).

The rate of mortality in asthma patients in SARS CoV 2

One research is reported that asthma cause mortality in SARS CoV 2 patients. The TP of asthma is 83 and DR is 25 (30.1%).

The rate of mortality in CKD patients in SARS CoV 2

Six researches are reported that CKD is also cause mortality in SARS CoV 2 patients. The TP of CKD is 746 and DR is 224 (30%).

The rate of mortality in CVD patients in SARS CoV 2

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Four researches are reported that CVD cause mortality in SARS CoV 2 patients. The TP of CVD is 670 and DR is 195 (29.1%).

The rate of mortality in diabetes patients in SARS CoV 2

Seven researches are reported that diabetes is also cause mortality in SARS CoV 2 patients. The TP of diabetes with SARS CoV 2 is 2180 and DR is 567 (26%).

The rate of mortality in heart failure patients in SARS CoV 2

Four researches are reported that heart failure is also cause mortality in SARS CoV 2 patients. The TP of heart failure is 831 and DR is 156 (18.7%).

The rate of mortality in cancer patients in SARS CoV 2

Three researches are reported that cancer cause mortality in SARS CoV 2 patients. The TP of cancer is 329 and DR is 33 (10%).

The rate of mortality in COPD patients in SARS CoV 2

Two researches are reported that COPD cause mortality in SARS CoV 2 patients. The TP of COPD is 994 and DR is 94 (9.4%).

The rate of mortality in HIV patients in SARS CoV 2

One research is reported that HIV cause mortality in SARS CoV 2 patients. The TP of HIV is 11 and DR is 1 (9%).

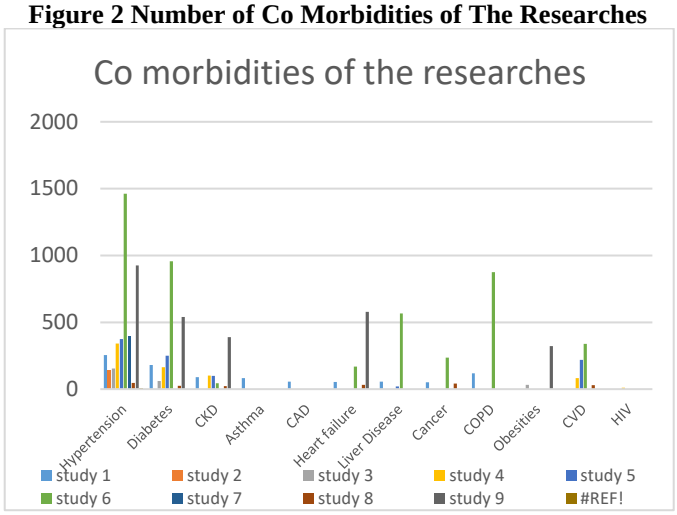
The rate of mortality in CAD patients in SARS CoV 2

One research is reported that CAD cause mortality in SARS CoV 2 patients. The TP of CAD is 56 and DR is 5 (8.92%).

The rate of mortality in liver disease patients in SARS CoV 2

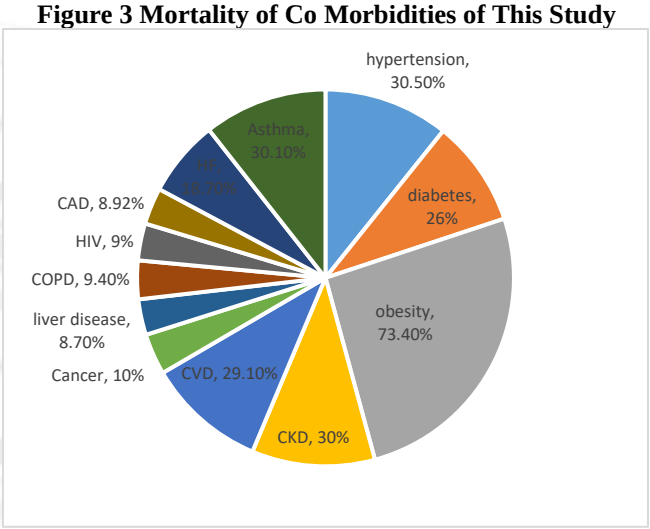
Three researches are reported that liver disease cause mortality in SARS CoV 2 patients. The TP of liver disease is 643 and DR is 56 (8.7%).

Figure 2 Number of Co Morbidities of The Researches



C K D; Chronic Kidney Disease, C A D; Coronary Artery Disease, COPD; Chronic Obstructive Pulmonary Disease, C V D; Cerebrovascular Disease, H I V; Human Immunodeficiency Virus

Figure 3 Mortality of Co Morbidities of This Study



C K D; Chronic Kidney Disease, C A D; Coronary Artery Disease, COPD; Chronic Obstructive Pulmonary Disease, C V D; Cerebrovascular Disease, H I V; Human Immunodeficiency Virus

Table 2 Characteristics of The Included Studies

Study	Country name	Study types	Number of cases	Co morbidities In number	Co morbidities In percentage
Study 1 (6)	United states	Retrospective study	1305	947	72.6%
Study 2 (7)	Italy	Retrospective study	344	141	40.9%
Study 3 (8)	China	Cohort study	633	247	39%
Study 4 (9)	United states	Systemic review	1786	700	39.2%
Study 5(4)	China	Cohort	1842	953	51.7%
Study 6 (1)	Korea	Retrospective study	7590	4658	61.3%
Study 7 (10)	China	Cohort	1099	393	35.8%
Study 8 (11)	United kingdom	Systemic review	614	198	32.2%
Study 9 (12)	Spain	Retrospective cohort study	4412	2754	62.4%

Discussion:

Principle Finding

The consequence of this narrative review suggest that admitted patients with SARS CoV 2 with existing co-morbidities such as Obesities, Hypertension, Asthma, CKD, CVD, Diabetes, Heart failure, Cancer, COPD, HIV, CAD and liver disease have abundant risk of mortality from SARS CoV 2.

The patients of SARS CoV 2 have broad range of symptoms and the majority of patient have infected with mild symptoms and less patient have develop severe symptoms. The presence of co morbidities has a feasible risk factor for increase mortality in SARS CoV 2. We found that existing co-morbidities are strongly related with increase mortality in SARS CoV 2 patients.

The corona virus is the causative agent of SARS CoV 2, to combine with angiotensin converting enzyme 2 (ACE 2), a cellular combining site in heart, kidney and pulmonary alveolar type 2 cells. It has been suppose that existing use of angiotensin-ll type-1 receptor blockers (ARBs) may regulate membrane bounding ACE ll increasing vulnerability to virus to enter in human. It is probable that a person with existing chronic condition like as heart failure and hypertension taking angiotensin ll type 1 receptor blockers might be more vulnerable to the severity of SARS CoV 2, including mortality. (5) The studies shows that hybridization of corona virus is present in the small intestine, lungs, kidney, liver and many other tissues show that ACE 2 presenting organs may face as direct target of corona virus. Furthermore other protein like as CD147 and TMPRSS2 may a portal of entry for corona virus.

Comparison with other research studies

The study findings are same results from previously published systemic review, suggestion a greater mortality rate of SARS CoV 2 individuals with co-morbidities such as Hypertension, diabetes, C K D, chronic liver disease, heart failure, asthma, cancer, HIV, coronary artery disease, obesity, COPD and Cerebrovascular disease. The previous studies (4, 5) found a twofold greater risk in mortality in patients with COVID-19 with co morbidities.

Conclusion:

Our finding suggest that of co-morbidities analyse such as Obesities, Hypertension, Asthma, CKD, CVD, Diabetes, Heart failure, Cancer, COPD, HIV, CAD and liver disease carry the greater risk of mortality from SARS CoV 2. This narrative review highlights the importance of paying attention to the population with these SARS CoV-2 co-morbidities and the needs of preventive strategies and treatment to plain.

Strength and Limitation

This study provides recent results of co morbidities furthermore strengthen the evidence of mortality in patients with SARS CoV 2. The study brings larger number of individuals from countries such as United States, China, United Kingdom, Spain, Korea and Italy. This study had several limitations because short time, limited resources and search only Pub Med and Google Scholar. Some studies show the race and ethnicity, age and region while some studies provide little or no information. We did not investigate race and ethnicity, age and region influence which did have been a cause our study limitations

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CONFLICT OF INTEREST

Authors declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request

JBAHS web address: www.jbahs.pk
Email address: editor.jbajhs@superior.edu.pk