Impact of Comorbid Conditions in COVID-19 Treatment

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

Systematic Review Article

ABSTRACT

In 2019, an outbreak known as SARS-CoV-2 spread all over the World from China city Wuhan. This epidemic rapidly spread throughout the world from that day, affecting 180 nations. Individuals of all ages were involved in this outbreak, and this spread at a high rate. COVID-19 is thought to lead to death due to its increasingly fast and severe course in people with serious health issues and complications. In this paper the impact of comorbid condition in COVID-19 treatment was investigated. To conduct an automated literature review, statistical information from published articles was gathered between January 20 and April 20, 2020. Immunocompromised patients might be more prone to acquire COVID-19 compared to healthy individuals. Additionally, people with dementia, those 65 years and above, who had comorbidities and COVID-19 had more chance of getting admitted to ICU and dying. That is why immunocompromised patients need more care and attention so that they might not be affected by this outbreak, which may lead to their death.

Keywords: Comorbid conditions; COVID-19; treatment.

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1. INTRODUCTION

A systematic review study has been conducted on moderately aged and old individuals. This study shows that the mortality rate of COVID-19 is higher in elderly people, and they are more at risk of being admitted to ICU. Alterations in the structure of the lungs and hypoplasia might be the reason for the variation between different age groups. This may change the metabolic performance, respiratory capacity loss, lowering of spontaneous breathing, and loss of defensive membrane integrity [1]. Age and other environmental factors are directly linked with the clinical results and the period of days patients spent in ICU [1].

In China, scientists investigated 344 patients affected by COVID-19 who were in the ICU. With the midpoint of 25 days, On the 28th day of the study, 133 out of total patients died [2]. There were a lot of comorbidities among these individuals, as 141 of them were suffering from hypertension. An overall treatment time for a false negative result is 12 days among people who survived. Additionally, another study has also been conducted in the same country. Scientists took 633 individuals affected with coronavirus; out of the total patients, 247 were immunocompromised and were comorbid [3]. This research study shows that people above the age of 60 are vulnerable to having a more severe type of illness from this disease. Twenty-five individuals with an average age of 69.3 years died, resulting in a 3.77 percent effective fatality rate [4].

The Centers for Disease Control and Prevention (CDC) in the United States utilizes COVID-NET in fourteen states to track the overall statistics of COVID-19 patients in hospitals. Results showed that 180 patients on COVID-NET from March 1-30, 2020, including 89.3 percent of them, have some intrinsic comorbidities. 94.4 percent of the 180 patients aged 65 and up had at least one ailment. The most prevalent morbidities discovered were overweight, high blood pressure, and diabetes mellitus [5]. Almost all individuals with severe COVID-19 symptoms had comorbidities. This article aims to examine those comorbidities. Moreover, derived from the literature report after the epidemic, we would want to investigate particular comorbidities related to COVID-19 development and its consequences.

2. METHODOLOGY

PubMed, Google Scholar, EBSCOhost, Mendeley, and MedLine Plus conducted an online research study. Only peer-reviewed literature was considered between January and April 20, 2020 [6]. Terms like coronavirus, COVID-19, SARS-CoV-2, disease manifestations, comorbidity, hyperglycemia, and high blood pressure were used to identify articles. Following that, papers have been assessed and added depending upon their relevance to this study.

3. COVID-19 DIAGNOSTIC PARAMETERS AND CONSEQUENCES IN THE PRESENCE OF COMORBIDITIES

3.1 Features of Diagnosis

COVID-19 cases that have been confirmed and reported have a wide range of adverse symptoms, ranging from minor irritations like fever and cough to more severe issues like difficulty breathing [7]. The most common symptoms are fever, shivering, difficulty in breathing, muscular crackles, sinus infection, inexplicable absence of smell or taste, diarrhea, and migraine [8]. After 5 to 7 days, Symptoms progress from mild to severe especially in patients with pneumonia [8]. Typically, one out of every six affected persons becomes sick and has respiratory problems, notably among the elderly with primary diseases.

A metaanalysis of COVID-19 patients, as portrayed in Fig. 1, showed fever as the well-known symptom with a % of 88.8, trailed by dry cough (68%) and exhaustion (33%) [9]. Different symptoms noted were productive cough (28.5%), SOB (17%), muscular cramps (14.4%), sinus infection (11.4%), along with cerebral pain (10.2%) [10]. The uncommon symptoms were loose bowels (4.4%), sickness and retching (4.1%), rhinorrhea (3.2%), abdominal pain (0.16%), and chest pain (0.11%).

The symptoms of COVID-19 appear within two-fourteen days after infection; hence, a quarantine of fourteen-day is suggested [9]. The typical incubation period for this infection is roughly five and a half days [10]. In China city named Wuhan, the most widely recognized side effects seen from the beginning of this flare-up incorporate fever, cough, and weakness. At the same time, specific highlights which have not been so

predominant were sputum production, migraine, hemoptysis, and gastrointestinal side effect, for example, loose bowels [11, 12]. One more review in another city of China named Beijing revealed the average age of COVID-19 patients as 35.5 years, with a median of 3.5 days between the onset of adverse symptoms and clinic confirmation [13]. A similar report additionally explains that fever was present in approximately 87.5% of patients who persisted for six to seven days, and the symptoms resolved three or more days after a false experimental outcome [12].

A few affected people are asymptomatic, and around 80% of positive cases recuperate from the illness with practically no treatment [14]. Nonetheless, there have likewise been examples of transmissions of COVID-19 from asymptomatic patients and those with mild disease [15]. It becomes vital to look for clinical consideration right away, assuming an individual suspects that they might have been contaminated or is an affirmed instance of COVID-19 encountering respiratory misery, has blue lips, is in steady torment, or has tension in the chest [7]. Additionally, it is critical to note that COVID-19 is more irresistible than SARS-CoV

and MERS-CoV because of its various epidemiological and organic qualities.

3.2 Comorbidity

The information about this disease is restricted because of the latest emergence and several types of research. The emergence cases' outcomes have shown that the possibility of getting COVID-19 increases with an increase in comorbidity [7]. In light of the latest data & clinical mastery, the aged people, particularly those who live in medical care for a more extended period, and individuals of all ages with genuine fundamental diseases have more chances of getting COVID-19 [7]. Immunocompromised patients suffering from hypoglycemia,lung and heart diseases are at risk of being infected with COVID-19. This disease can cause the death of these patients if they are exposed to the virus. COVID-19 infection is more likely in individuals who have uncontrollable clinical conditions, including hyperglycemia, high blood pressure, pulmonary, hepatic, and renal illness; people with cancer on radiotherapy; people who smoke; recovering from surgery; also individuals who take supplements regularly.
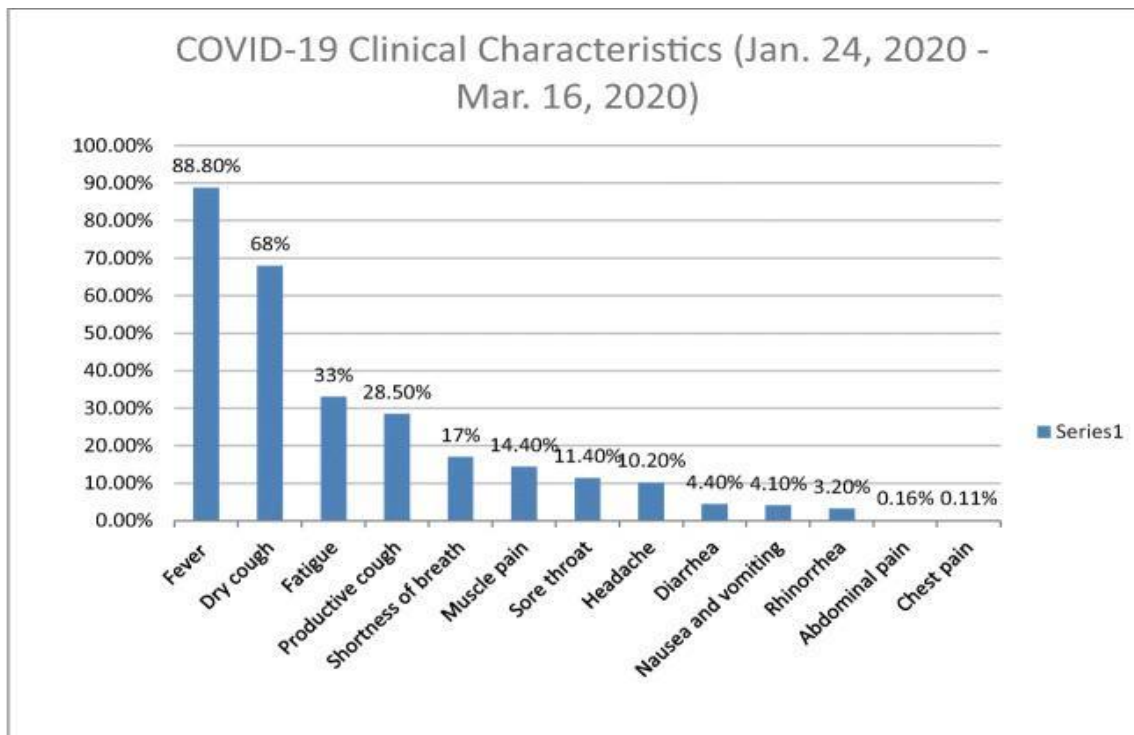

Fig. 1. COVID-19 Clinical Characteristics
Note: Data obtained from research square, a meta-analysis of the 2019 novel coronavirus, showing clinical characteristics observes in patients, as of April 8,2020 [10]

Total patients with 1786 were considered for research on COVID-19. Out of 1786, the male was 1044, the female was 742, and forty-one was the average age. Patients were identified with different types of comorbidities, including high blood pressure {15.8%}, hyperglycemia {9.45%} and heart and CNS diseases {11.7%}. [15] The more uncommon comorbidities were existing together with the disease HIV and hepatitis B (1.5%), carcinoma (1.5%), pulmonary infections (1.4%), kidney infection (0.8%), and immunodeficiencies (0.01%).

Asthmatic individuals are more at risk of having severe side effects of this virus because they already have a weak pulmonary system, pneumonia & bronchitis, and other intense respiratory disorders. As per the CDC's weekly incidence and death data, 34.6 percent of patients 18 - 49 years old had a severe respiratory illness like bronchitis [16]. A literature review from Iran explains that a person having a gene susceptibility to COVID-19 may increase his chances of contracting Severe acute respiratory virus and dying due to this illness [17]. The hereditary propensity has been reported among three siblings in Iran, aged 54, 60, and 66, victims of COVID-19 while having no known comorbidity and residing independently [18].

In Wuhan and China, 41 patients were admitted to the hospital due to the positive results of COVID-19 on January 2, 2020. Of the patients who are admitted in which 31 patients, we can say 73% patients are men and their age is 49 years old, 27 patients (66%) appear from the Huanan market, 13 patients (32%) are affected by diabetes, and eight patients 20% from high blood pressure or hypertension, and only six patient (15%) from cardiovascular. [19] People with a positive HIV result with Low CD4 count and no antiretroviral treatment are at high risk of contacting COVID-19.

Between March 1 -30, 2020, a demographically monitoring assessment through the COVID-19-Associated Hospitalization Monitoring System (COVID-NET) published scientific information about 1478 COVID-19-positive patients admitted to hospitals. Of the 1478 individuals investigated, 12% of adults had clinical evidence indicating actual disease disorders, the common of which was high blood pressure (49.7%), followed by overweight (48.3%) [20]. Severe respiratory illness (34.6%), dyslipidemia (28.3%), and heart disorders (27.8) were among the other clinical problems.

4. RESULTS

COVID-19 can cause severe sickness prompting hospitalization in ICU and possibly demise, particularly in the older population with comorbidities [21]. As indicated by the CDC, 8 out of 10 deaths recorded in the USA happened in grown-ups 65 years of age or more [7]. Generally, 80% of COVID-19-positive cases recover from the disease with practically no hospitalizations [9]. There are numerous realities that we have close to zero insight into COVID-19 because of knowledge gaps ; consequently, further research is needed to address these knowledge gaps.

From December 16, 2019, to January 2, 2020, 41 patients were admitted to the emergency clinic in Wuhan, China, who tested positive for COVID-19, with clinical outcomes shown in Fig. 2 [12]. In the clinic, 100% of the 41 patients with confirmed COVID-19 had pneumonia, 29% had severe respiratory distress syndrome (ARDS), 15% developed severe cardiovascular damage, and 12% developed secondary infection [12]. The majority of these patients (68%) were discharged, while 17% stayed in the hospital, 10% ended up in the intensive care unit, and 15% died.

An evaluation of the qualities and findings of 21 essentially unwell patients with affirmed COVID-19 determination was conducted in Evergreen, Washington, from February 20 to March 5, 2020 [22]. According to this study, Endotracheal intubation was recommended for 71% of the affected individuals, and every single one of them had severe respiratory distress [22]. Fifty-three percent of the affected individuals had died due to ADRs. Developed worsening respiratory problems, resulting in unfavorable transitory outcomes and a greater risk of mortality [22]. The fatality rate in these individuals was 67% as of March 17, 2020, with 24% seriously unwell and 9.5% released from the emergency clinic.

As seen in Fig. 3 from the CDC's mortality and morbidity weekly report, the death rate is directly linked to the age factor of individuals [21, 23]. There was no ICU confirmation or death within the age group of 19 [24]. Coronavirus has also been found in children; however, the sickness had a more benign course compared to adults.
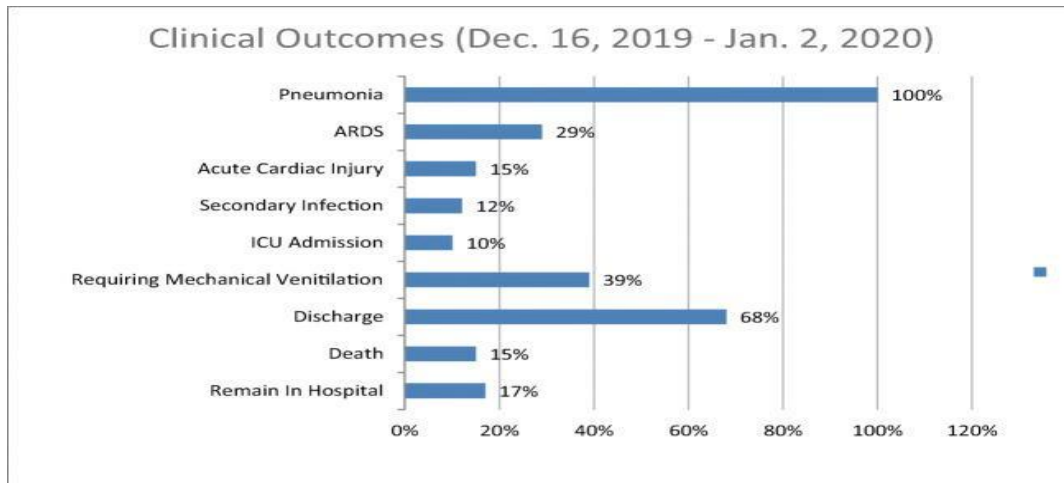
Fig. 2. Clinical outcomes
Note: Data obtained from the lancet showing clinical features of patients infected with 2019 novel coronavirus in wuhan, China, of January 24, 2020 [12]
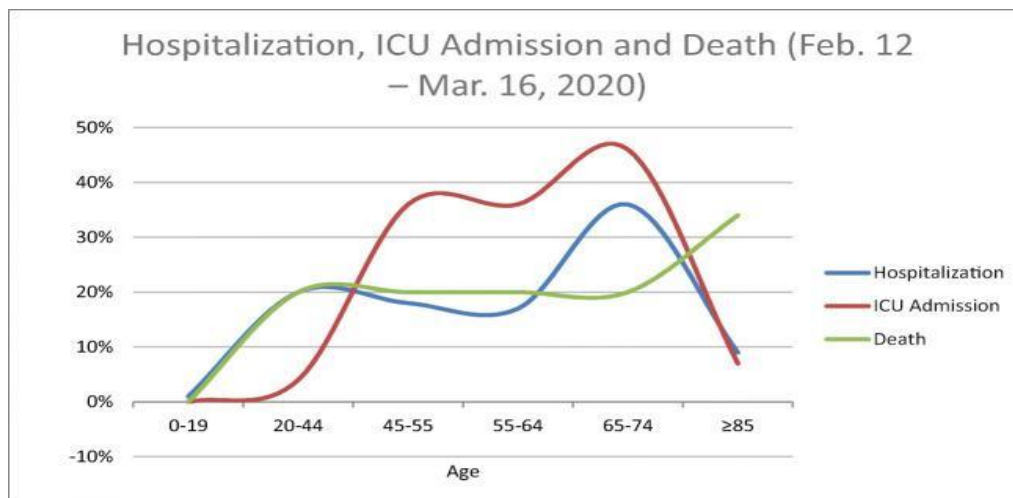

Fig. 3. Hospitalization, ICU admission and death
Note: Data obtained from the CDC showing severe outcomes among patients with coronavirus disease 2019 (COVID-19) in the USA from February 12, 2020 through March 16, 2020 and reported, as of March 27, 2020 [21]

On April 29, 2020, the World Health Organization reported more than 3 million suspected cases of COVID-19 case throughout the world, including the death of ~ two lac people all over the world [25]. The United States is considered a hotspot region for COVID-19 with a high death rate of ~ fifty thousand individuals, then comes Italy having the death of ~ twenty-five thousand individuals. The last one is Spain's ~ twenty thousand deaths reported [25]. Along with the highest number of illnesses and mortality for every population of almost any other region, New York is the worst afflicted by the new Covid spreading across the United States. According to Table, the New York State Department of Health

claims that more than 86% of COVID-19 mortality needed at least one comorbidity.

5. DISCUSSION

The severity of COVID-19 infection is associated with the comorbid conditions. Most common comorbidity is cardiovascular disease. The more the person has cardiovascular disorder the more the chances he might get COVID-19 [26]. This could also be a significant consequence of coronary heart disease due to extra morbidities in contrast to the coronary heart problem [27]. Individuals suffering from type II hemophiliac are at risk of exposure to this virus [28]. Another

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further research involving 7337 COVID-19 participants suffering from hemophilia or normal was conducted. The outcomes show that individuals with type II hemophiliac need more extensive therapies throughout their medical clinic stay than those who do not have diabetes [28]. According to research, individuals having poor glycemic control seemed to have a greater death risk than those with adequate glycemic control.

Table 1. Leading comorbidities among COVID-19 deaths in NY, USA

Comorbidities	Dearh%
Hypertension	55.4%
Diabetes	37.3%
Hyperlipidemia	18.5%
Coronary artery disease	12.4%
Renal disease	11.0%
Dementia	9.1%
COPD	8.3%
Cancer	8.1%
Atrial fibrillation	7.1%
Heart failure	7.1%

Data repored by hospitals, nursing home and health facilities to the New York State Department of Health, as of April 6,2020

The study concluded that individuals with blood glucose levels in the range of 3.9 to 10.0 mmol/L had a lower risk of composite adverse events and death [28]. It was discovered that poor blood glucose management resulted in a dramatically increased risk of complications and death [28]. Chronic obstructive pulmonary disease (COPD), among other comorbidities, has also been linked to unfavorable illness progression. In patients with preexisting COPD who were found to have COVID-19, a meta-analysis of several studies in China found a four-fold increase in mortality [29]. The smoking status of the patients and the severity of COVID-19 were also taken into account in this study. Only one report established a link between smoking and COVID-19 severe courses [29].

Patients with severe respiratory distress and disappointment following treatment with the new Covid may have prothrombotic coagulopathy [20]. COVID-19-related deaths have dispersed microthrombi in the pneumonic vasculature, indicating an occlusive etiology of respiratory disappointment. Following treatment with intravenous (IV) antithrombotic alteplase, three instances of COVID-19-related severe respiratory difficulty condition (ARDS) and respiratory disappointment showed a 38 to 100 percent improvement. Although encouraging, the results were only temporary in two of the three patients, with recovery stalling after therapy [29]. Anti-thrombolytic treatment should also be investigated to ensure that the outcomes are due to the treatment rather than chance alone. Until March 1, 2020, a review meta-examination of 1558 COVID-19 patients was conducted on people with concealed comorbidities and the risk of acquiring COVID-19 [21]. Compared to other concealed illness states, normal comorbidities such as hypertension, COPD, diabetes, and cardio-cerebrovascular infection were more essential risk factors in patients [11].

Aside from extreme measures, decisive therapy appears elusive [11]. When compared to individuals with no fundamental infection, specialists believe when exposed to the novel Covid, patients with comorbidities had a more significant disease result [21]. The small sample size hampered the review, and a few participants had more than one basic comorbidity. According to previous research and literature, Hidden infections increase the mortality rate in COVID-19 patients; the primary risk factors include cardiovascular diseases and hemophiliac [22]. Eventually, due to a shortage of sample size and time, the information acquired had to be limited.

6. CONCLUSION

More than 180 nations have been impacted by COVID-19, bringing about mass demise worldwide. As cases develop worldwide, it has been noticed that people with fundamental ongoing ailments are bound to get the infection and become seriously sick. Because SARS CoV-2 is a relatively recent illness, the available information seems limited. Notwithstanding, comorbid patients have additional weakening results contrasted and patients without. Coronavirus patients already suffering from high blood pressure, weight, persistent pulmonary disease, hemophiliac, and heart diseases are more likely to have an awful guess and most frequently end up with breaking down results like ARDS and pneumonia. Likewise, older patients in long-haul care offices and patients with persistent adrenal infection and malignant growth are more likely to get the disease. Yet, there is an essentially expanded hazard of death among these gatherings of patients.

Coronavirus's unfavorable impacts went from gentle respiratory ailment to a significant disease

requiring quarantine and mechanical taking in occurrences detailed worldwide. Since the patient is asymptomatic for a timeframe and the agonizing time frame is somewhere between 2 and 14 days, it is challenging to do an early investigation, substantially less breaking point the sickness's transmission. It is inadvertently presented to expect to be that of the patient. Be that as it may, assuming unfriendly respiratory impacts create as of now, finding specific fire care is fundamental.

Accordingly, patients with comorbidities ought to play it safe to avoid getting contaminated with SARS CoV-2, as they have the most exceedingly terrible anticipation. These insurances incorporate regular washing of hands through cleanser and water or hand sanitizer with alcohol, restricting individual-to-individual contact & rehearsing sociological removal, putting a facial covering out in the open spots, and generally restricting going to public regions right now except if it is essential. Thus, there is a requirement for a worldwide general well-being effort to bring issues to light, reducing the weight of such comorbidities illnesses that cause deaths in COVID-19-affected individuals.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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