

The Severity of the COVID-19 Among Chronic Disease Patients in the Selected Hospitals in Riyadh, Saudi Arabia – A Retrospective Study

Mahmood Basil A Al-Rawi , Amer Hayat Ibrahim Khan , Siti Maisharah Sheikh Ghadzi

Discipline of Clinical Pharmacy, School of Pharmaceutical Sciences, Universiti Sains Malaysia, Penang, Malaysia

Correspondence: Mahmood Basil A Al-Rawi, Discipline of Clinical Pharmacy, School of Pharmaceutical Sciences, Universiti Sains Malaysia, Penang, Malaysia, Email basialrawi@gmail.com

Background and Aims: Chronic disease is a lifelong disorder that necessitates continuing medical care and is more prone to infections such as COVID-19, compared to healthy individuals. Therefore, this study aimed to assess the severity of COVID-19 among chronic disease patients in the Kingdom of Saudi Arabia.

Methods and Materials: A cross-sectional study was conducted in selected hospitals in the Riyadh region in Saudi Arabia, over 6 months in 2022. All participants' records were reviewed for socio-demographic data including age, gender, residence, marital status, level of education, occupation, and special habits such as smoking or addiction. In addition to this main complaint and present history, history of chronic illnesses, drug intake, surgical interference, general examination findings including vital signs, state of consciousness, general condition at admission and discharge, and outcome of cases were recorded.

Results: The mean age of the patient was 54.46 ± 15.85 (median of 53.67 years). In this study, the severity of COVID-19 was significantly associated with chronic diseases. For instance, 22.31% of the patients with diabetes reported mild symptoms, compared with 77.69% of the patients without diabetes. The current findings reported 2.18% of COVID-19 patients with respiratory diseases and 97.82% of the patients without respiratory diseases reported mild symptoms of COVID-19 infection. In comparison, 97.75% of COVID-19 patients without respiratory diseases and 2.25% of patients with respiratory diseases reported moderately severe COVID-19 infection.

Conclusion: The current findings revealed that 66.2% of the COVID-19 patients with chronic diseases were free of symptoms, 5.3% of them died and 0.9% of the patients were in a worse situation. The severity of COVID-19 was significantly associated with the presence of chronic diseases. Additionally, medical practitioners must be more knowledgeable about the long-term illnesses that put patients at risk for serious COVID-19 challenges and mortality.

Keywords: COVID-19, chronic diseases, obesity, diabetes, hypertension

Introduction

Following the discovery of the first COVID-19 case on March 2, 2020, governments around the world, including Saudi Arabia, implemented a series of preventative measures in response to the pandemic.¹ Because there was no established treatment for COVID-19, all countries suspended work, prohibited going out, closed schools and universities, and suspended international flights, eventually implementing a partial lockdown of the entire world.¹ Because of the increased number of cases in Saudi Arabia and other international countries, WHO has declared a full nationwide lockdown from April 6 to May 28, 2020. Following that, the lockdown was partially lifted in most cities, regional and domestic flights were permitted, and retail stores, shopping centers, and restaurants reopened. The lockdown was lifted in all regions of Saudi Arabia on June 21st, 2020.^{1,2}

This COVID-19 disease can be spread very quickly, through direct or indirect contact with the infected person's droplets from coughing or sneezing or face-to-face exposure while talking. Additionally, surfaces that the infected people interacted, with and the presence of aerosols in the air (smaller droplets that float in the air) were an another most

common possible source of transmission. Although transmission also occurs when longer exposures to infected individuals and shorter exposures to those who are symptomatic (coughing, for example) are linked to a higher risk for transfer, short exposures to contacts who are asymptomatic are less likely to cause transmission.²⁻⁴

Chronic disease is a disorder that lasts for a year or longer and necessitates continuing medical care. Cardiovascular diseases, such as hypertension, stroke, coronary heart disease (CHD), heart failure (HF), cancer, diabetes, and respiratory disease are the most prevalent examples of chronic noncommunicable diseases and are also the main causes of mortality and disability worldwide.⁵ Globally, the prevalence of chronic diseases is on the rise and ischemic heart disease (IHD), stroke, lung cancer, depression, diabetes, and back and neck pain are the most prevalent forms of diseases contributing to increased mortality and morbidity in both developed and developing countries.^{6,7} Furthermore, previous literature suggested that one in three adults suffered from more than one chronic disease or multiple chronic conditions, and it is predicted to increase dramatically.^{6,8} It was evidenced that the most common causes of death in the United States are the result of chronic disease.^{8,9} At least six in ten US adults have at least one chronic illness, such as diabetes, cancer, heart disease, or a stroke.^{8,9} Additionally, chronic diseases are the main contributing factors to the rise in annual healthcare costs and the primary causes of disability.^{8,9}

According to The Centers for Disease Control (CDC) and Prevention, WHO has worked with Saudi Arabia for over 20 years revealed that ischemic heart disease, followed by Road injuries, Stroke. Kidney disease, Lower respiratory infections, Alzheimer's disease, Conflict and terror, Cirrhosis Neonatal disorders, and Diabetes were the top ten chronic diseases most frequently reported among Saudi adults.¹⁰

It has long been known that people who have a chronic illness are more likely than other people to get COVID-19 infection. People with chronic diseases have been affected both directly and indirectly by the COVID-19 pandemic, which has also made it more difficult to prevent or control chronic disease.^{9,11} Additionally, studies have shown that having NCDs, being older, and being obese raises the risk of morbidity and mortality in the case of COVID-19 infection.^{5,12-14}

Many previous studies reported that COVID-19 patients suffered from multiple chronic disease conditions, the most frequent were hypertension, diabetes, cardiovascular disease, chronic pulmonary disease, chronic kidney disease,¹⁵ malignancy, and chronic liver disease.¹⁶⁻¹⁸ These NCDs further raise the chance of developing a serious illness from COVID-19, which increases morbidity and mortality, particularly among elders who suffer from NCDs.¹⁹ Research also heightened that in addition to NCDs, chronic smokers, and pregnant women are two more variables that raise the risk of COVID-19-related serious infection.¹⁷⁻²⁰ Lastly, more people have died from various reasons, including dementia, cardiovascular disorders, and diabetes, in addition to COVID-19-related mortality. This increase may be attributable to the undercounting of COVID-19 deaths or the virus's unintended consequences, such as underuse of or strain on the healthcare system.⁹ Overall, the literature suggested that these chronic conditions were significantly associated with an increased in-hospital case fatality rate (CFR). Overall, older adults have a substantially higher case fatality rate (CFR) as compared to younger individuals affected by COVID-19.¹⁵ Therefore, this study aimed to assess the severity of COVID-19 among chronic disease patients in the Kingdom of Saudi Arabia.

Methods and Materials

A retrospective cross-sectional study of COVID-19 hospital-admitted patients having chronic diseases was carried out in selected healthcare facilities which were recognized as the government and the largest university and specialist hospitals in Riyadh, Saudi Arabia. The study was carried out on 11 March 2020 until the required data was obtained. All patients suffering from chronic diseases and positive for COVID-19 infection, admitted to the four main isolation hospitals in Riyadh City, the capital of Saudi Arabia since the start of the pandemic, were the target of the study. An ethical issue that was considered in this study was regarding the patient's confidential information since their medical records in the database were explored to obtain information. Patients' names and identity numbers were not recorded in the data collection form to maintain patient confidentiality and privacy. Permission to access the patient's information was obtained from the local Ethical Committee of the Ministry of Health. In addition, the study complies with the Declaration of Helsinki guidelines for human research.

COVID-19 patients' records with the presence of chronic diseases in the selected hospitals have been reviewed for data collection. Missing data had been completed by direct contact with the patient or his/her family or relatives. Patients' records were reviewed for socio-demographic data including age, gender, residence, marital status, and body

mass index (BMI). In addition to this history of present illness, drug intake, surgical interference, and severity of the diseases, general examination findings including onset of symptoms before admission, duration of illness in days, vital signs, and laboratory workup among studied patients, and outcome of cases were recorded.

Selected hospitals in Riyadh City were contacted by the author for approval to implement the study. A letter of recommendation was provided by the ethical committee to conduct the study and facilitate the flow of work. Obstacles, if any, were dealt with immediately. The electronic files of patients were reviewed directly by the author. A data collection sheet has been prepared to facilitate the collection of data.

Statistical Analysis

Data were presented and statistically analyzed using the SPSS Statistical Package for Windows, Version 27. Continuous data were presented in mean and standard deviation. Meanwhile, categorical data were presented in frequency and percentage. To find out the association between variables, Chi-square or Fisher exact test used at a 5% level of significance was used.

Results

Eight thousand two hundred and two patients ($n = 8202$) completed the study. [Table 1](#) shows the socio-demographic characteristics of the patients. In the present study two-thirds (67%) of the patients were males. Patients' age ranged from

Table 1 Shows the Socio-Demographic Characteristics of the Patients

Characteristics	Frequency (n)	Percent (%)
Age	N=8202	100.00
Mean	54.46	
SD	15.85	
Median	53.67	
Range	5–95	
Gender		
Male	5495	67.00
Female	2707	33.00
Total	8202	100.00
Nationality		
Saudi	5234	63.8
Non-Saudi	2968	36.2
Total	8202	100.00
Marital status		
Single	2004	24.4
Married	5182	63.2
Divorced	120	1.5
Widow	896	10.9
Total	8202	100.00

(Continued)

Table 1 (Continued).

Characteristics	Frequency (n)	Percent (%)
Body mass index (BMI)		
Underweight (- 20)	659	8.0
Normal (- 25)	908	11.1
Overweight (- 30)	2470	30.1
Obese (30 +)	4165	50.8

5 to 95 years with a mean of 54.46 ± 15.85 SD and a median of 53.67 years. Nearly 64% were Saudi. One-quarter of them (24.4%) were singles, 63.2% were married, whereas only 10.9% and 1.4% were widows and divorced, respectively. With regard to the body mass index (BMI) of the patients, half of the patients were obese, while nearly one-third (30.1%) were overweight only 11.1% were normal weight and 8% of the patients were found underweight. Furthermore, the detailed frequencies of the patient's socio-demographic characteristics and clinical features are given in [Table 1](#).

History of Present Illness Among Studied Patients

With regard to the history of present illness among studied patients, more than two-thirds (65.9%) had dyspnea, 64.61% had a fever, more than half of the patients (57.35%) had a cough, and nearly two-fifths (23.31%) had muscle ache; moreover, 7.49% had a sore throat, 6.75% had diarrhea and vomiting, and 6.22% were asymptomatic. Only 3.75% and 2.05% had disturbed consciousness and dizziness, respectively. Chest heaviness, running nose, loss of taste, and loss of smell were reported by 0.87%, 0.76%, 0.62%, and 0.61%, respectively. [Table 2](#) provides detailed information regarding the history of present illness among studied patients.

Severity of Symptoms

[Table 3](#) describes the details about the severity of the symptoms among studied patients on hospital admission. According to findings 9.0%, 63.4%, 19.1%, and 8.5% of patients suffered from mild, moderate, severe, and critical severity, respectively.

The Onset of Symptoms Before Admission, Duration of Illness in Days, Vital Signs, and Laboratory Workup Among Studied Patients

The mean score of onset of symptoms before admission in days was 4.97 ± 5.625 (range 0–37), whereas the duration of illness in days was 11.53 ± 14.573 ([Table 4](#)). With regard to Vital signs during the admission among the patients, 37.56 of mean temperature (SD = 0.81) was recorded, while the mean pulse rate was 82.86 (SD = 16.41). With regard to blood

Table 2 History of Present Illness Among Studied Patients

Main complaint	Frequency (n)	Percent (%)
Dyspnea	5406	65.91
Fever	5299	64.61
Cough	4704	57.35
Muscle ache	1912	23.31
Sore throat	614	7.49
Diarrhea and vomiting	554	6.75
Asymptomatic	510	6.22
Disturbed consciousness	304	3.71

(Continued)

Table 2 (Continued).

Main complaint	Frequency (n)	Percent (%)
Dizziness	168	2.05
Chest heaviness	71	0.87
Running nose	62	0.76
Loss of taste	51	0.62
Loss of smell	50	0.61
Total	8202	100.00

Table 3 Severity of Symptoms Among Studied Patients on Admission

Severity	Frequency (n)	Percentage (%)
Mild	735	9.0
Moderate	5197	63.4
Severe	1569	19.1
Critical	701	8.5
Total	8202	100.0

pressure, the mean systolic blood pressure was 122.98 (SD = 17.979) reported, followed by mean diastolic blood pressure of 74.02 (SD = 11.036) was reported. In this study, the mean respiratory rate of the patients during the admission time was 20.83 (SD = 4.369), while the mean lipid profile was found as follows, which includes total mean cholesterol was 176.31 (SD = 53.008), LDL 122.65 $\pm$ 45.466; Triglycerides was 137.16 (SD = 38.854) and oxygen saturation 94.60 (SD = 4.337). Detailed information about the onset of symptoms, duration of illness, and vital signs was given in Table 4.

Table 4 Onset of Symptoms Before Admission, Duration of Illness in Days, Vital Signs, and Laboratory Workup Among Studied Patients

Domains	Range	Mean	Median	Standard Deviation (SD)
The onset of symptoms before admission in days	0–37	4.97	3.07	5.625
Duration of illness (In days)	1–99	11.53	7.04	14.573
Vital signs				
Temperature	36–40	37.56	37.30	0.81
Pulse	44–161	82.86	81.81	16.41
Systolic blood pressure	50–176	122.98	123.80	17.979
Diastolic blood pressure	30–109	74.02	74.38	11.036
Respiratory rate	10–98	20.83	20.09	4.369
Lipid profile				
Total Cholesterol	72–448	176.31	175.31	53.008
LDL	26–369	122.65	110.45	45.466
Triglyceride	54–369	137.16	130.27	38.854

(Continued)

Table 4 (Continued).

Domains	Range	Mean	Median	Standard Deviation (SD)
Oxygen saturation	53–100	94.60	95.13	4.337
Random sugar	64–623	160.88	123.72	81.165
HbA1C	4–13	6.66	5.79	1.936
Renal function				
Urea	1–186	23.99	18.18	18.945
Creatinine	1–13	1.15	0.90	1.019
Liver function				
AST	20–83	40.41	33.49	18.069
Total Bilirubin	2–30	8.75	8.39	3.540

The Severity of COVID-19 Concerning the Presence of Chronic Diseases

Presence of Diabetes and COVID-19 Severity Among Studied Patients

The detailed association between the severity of COVID-19 according to the presence of various chronic diseases in this study was given in Table 5. In this study, the severity of COVID-19 was significantly associated with chronic diseases. For instance, 22.31% of the patients with diabetes reported mild symptoms, compared with 77.69% of the patients without diabetes. Similarly, the majority of patients (82.22%; $n = 4273$) without diabetes reported moderate symptoms, in comparison to 17.78% of the patients with a history of diabetes. Similarly, 81.84% of the patients with diabetes reported severe symptoms and similar percentages (82.6%) of the diabetes patients with COVID-19 were found in critical condition. The severity of COVID-19 was significantly associated with the presence of diabetes among COVID-19 patients ($\chi^2 = 10.01$; $p = 0.018$) as shown in Table 5.

Table 5 Association Between Severity of COVID-19 According to Chronic Diseases

Variables	Severity					χ^2
	Mild n(%)	Moderate n(%)	Severe n(%)	Critical n(%)	Total n(%)	p
Diabetes mellitus						10.01 0.018*
Yes	164 (22.31)	924 (17.78)	285 (18.16)	122 (17.4)	1495 (18.23)	
No	571 (77.69)	4273 (82.22)	1284 (81.84)	581 (82.6)	6707 (81.77)	
Total	735 (8.96)	5197 (63.36)	1569 (19.13)	701 (8.55)	8202 (100.0)	
Hypertension.						36.35 0.0001*
Yes	77 (10.48)	880 (16.93)	254 (16.19)	73 (10.41)	1284 (15.65)	
No	658 (89.52)	4317 (83.07)	1315 (83.81)	628 (89.59)	6918 (84.35)	
Total	735 (8.96)	5197 (63.36)	1569 (19.13)	701 (8.55)	8202 (100.0)	
Hyperlipidemia						0.0001*
Yes	0 (0.00)	193 (3.71)	119 (7.58)	17 (2.43)	329 (4.01)	
No	735 (100.0%)	5004 (96.29)	1450 (92.42)	684 (97.57)	7873 (95.99)	
Total	735 (8.96)	5197 (63.36)	1569 (19.13)	701 (8.55)	8202 (100.0)	

(Continued)

Table 5 (Continued).

Variables	Severity					χ^2
	Mild n(%)	Moderate n(%)	Severe n(%)	Critical n(%)	Total n(%)	p
Renal disorders						263.31 0.000*
Yes	16 (2.18)	74 (1.42)	18 (1.15)	71 (10.13)	179 (2.18)	
No	719 (97.82)	5123 (98.58)	1551 (98.85)	630 (89.87)	8023 (97.92)	
Total	735 (8.96)	5197 (63.36)	1569 (19.13)	701 (8.55)	8202 (100.0)	
Cardiac Disease						24.83 0.0001*
Yes	16 (2.18)	269 (5.18)	74 (4.72)	14 (2.0)	373 (4.55)	
No	719 (97.82)	4928 (94.82)	1495 (95.28)	687 (98.0)	7829 (95.45)	
Total	735 (8.96)	5197 (63.36)	1569 (19.13)	701(8.55)	8202 (100.0)	
Cancer						0.0001*
Yes	0 (0.00)	93 (1.79)	57 (3.63)	0 (0.00)	150 (1.82)	
No	735 (100.0)	5104 (98.21)	1512 (96.37)	701 (100.0)	8052 (98.18)	
Total	735(8.96)	5197(63.36)	1569 (19.13)	701(8.55)	8202(100.0)	
Hypothyroidism						0.0001*
Yes	0 (0.00)	49 (0.94)	71 (4.53)	0 (0.00)	120 (1.46)	
No	735 (100.0)	5148 (99.06)	1498 (95.47)	701 (100.0)	8082 (98.54)	
Total	735 (8.96)	5197 (63.36)	1569 (19.13)	701 (8.55)	8202 (100.0)	
Respiratory disease (asthma)						13.102 0.0004*
Yes	16 (2.18)	117 (2.25)	62 (3.95)	14 (1.99)	209 (2.54)	
No	719 (97.82)	5080 (97.75)	1507 (96.05)	687 (98.01)	7993 (97.46)	
Total	735(8.96)	5197(63.36)	1569 (19.13)	701(8.55)	8202(100.0)	
Obesity						3.013 0.39
Yes	386 (52.51)	2645 (50.89)	792 (50.47)	337 (48.07)	4160 (50.72)	
No	349 (47.49)	2552 (49.11)	777 (49.53)	364 (51.93)	4042 (49.28)	
Total	735(8.96)	5197(63.36)	1569 (19.13)	701(8.55)	8202(100.0)	

Presence of Hypertension and COVID-19 Severity Among Studied Patients

The current finding revealed that there was a significant association between COVID-19 patients and the presence of hypertension. According to findings 10.48% (n = 77) of the COVID-19 patients with hypertension compared with 89.52% (n = 658) of the COVID-19 patients without hypertension reported mild disease. While 16.93% of the hypertensive COVID-19 patients compared with 83.07% of the COVID-19 patients without hypertension reported moderate disease. While 16.19% of the hypertensive patients and the majority 83.81% of the non-hypertensive patients with COVID-19 found severe disease. On the other hand, 89.59% of the COVID-19 patients without hypertension were found in critical condition in comparison to 10.41% of the hypertensive COVID-19 patients, indicating a statistically significant difference between the presence of hypertension and severity of the COVID-19 (p = 0.0001) as shown in [Table 5](#).

Presence of Hyperlipidemia and COVID-19 Severity Among Studied Patients

In this study, all of the COVID-19 patients without Hyperlipidemia (N = 735) reported mild severity, 96.29% of the patients without Hyperlipidemia and only 3.71% of the patients with Hyperlipidemia reported moderate severity of COVID-19. On the

other hand, 7.58% and 2.43% of the COVID-19 patients, with Hyperlipidemia found severe and critical conditions, in comparison to 92.42% and 97.57% of COVID-19 patients without Hyperlipidemia, as shown in Table 5. There was a significant association between the severity of the COVID-19 and presence of Hyperlipidemia ($p = 0.0001$).

Presence of Renal Disorders and COVID-19 Severity Among Studied Patients

The current finding revealed that there was a significant association between the severity of COVID-19 and the presence of renal disorders. According to the findings, 2.18% ($n = 16$) of the COVID-19 patients with renal disease and 97.82% ($n = 719$) of the COVID-19 patients without renal disease reported mild severity of the COVID-19. While 1.42% of the COVID-19 patients with renal disorders and 98.58% of the COVID-19 patients without renal disorders reported moderate severity of the disease. While 1.15% of the patients with renal disorders and the majority 98.85% of the patients without renal disorders found severe disease. On the other hand, 89.87% of the COVID-19 patients without renal disorders were found in critical condition in comparison to 10.13% of the renal disorders COVID-19 patients (Table 5).

Presence of Pneumonia and COVID-19 Severity Among Studied Patients

The severity of COVID-19 was significantly associated with the presence of Pneumonia. For instance, 16.33% of the patients with Pneumonia reported mild symptoms, while the majority (83.67%) of the patients without Pneumonia were found mildly severe. Similarly, the good majority of the patients (96.01%; $n = 4556$) without Pneumonia reported their severity was moderate, in comparison to 3.99% of the patients with Pneumonia. Similarly, 95.22% of the patients with Pneumonia reported severe symptoms, and similar percentages (83.02%) of the Pneumonia patients with COVID-19 reported critical conditions. The severity of COVID-19 was significantly associated with the presence of Pneumonia among COVID-19 patients ($\chi^2 = 109.29$; $p = 0.0001$).

Presence of Cardiac Diseases and COVID-19 Severity Among Studied Patients

The COVID-19 severity was significantly associated with the presence of cardiac diseases among studied patients. In this view, 2.18% of the COVID-19 patients with a history of cardiac disease and 97.82% of the patients without cardiac disease reported mild symptoms. Similarly, 5.19% of the patients with cardiac disease and 94.82% of the COVID-19 patients without cardiac disease were found moderately severe. On the other hand, 4.72% and 2.0% of the COVID-19 patients with a history of cardiac disease were found severe and in critical condition, respectively. The severity of COVID-19 was significantly associated with cardiac disease among COVID-19 patients ($\chi^2 = 24.83$; $p = 0.0001$).

Presence of Cancer and COVID-19 Severity Among Studied Patients

The severity of COVID-19 was significantly associated with the presence of cancer. For instance, patients without cancer reported mild symptoms, while the majority (83.67%) of the patients without cancer reported mild symptoms. Similarly, the good majority of the patients (96.01%; $n = 4556$) without cancer reported their severity was moderate, in comparison to 3.99% of the patients with cancer. Similarly, 95.22% of the patients with cancer were found severe, and similar percentages (83.02%) of the cancer patients with COVID-19 were found in critical condition. The severity of COVID-19 was significantly associated with the presence of cancer among COVID-19 patients ($\chi^2 = 109.29$; $p = 0.0001$).

Presence of Hypothyroidism and COVID-19 Severity Among Studied Patients

In this study, 95.47% of the COVID-19 patients without hypothyroidism were found severe, in comparison to 4.53% of the patients with hypothyroidism. Similarly, all of the patients without hypothyroidism were found in critical condition. There was a significant association between the presence of hypothyroidism and COVID-19 severity ($p = 0.0001$).

Presence of Respiratory Disease (Asthma) and COVID-19 Severity Among Studied Patients

The current findings reported 2.18% of COVID-19 patients with respiratory diseases and 97.82% of the patients without respiratory diseases reported mild symptoms of COVID-19 infection. In comparison, 97.75% of COVID-19 patients without respiratory diseases and 2.25% of patients with respiratory diseases reported moderately severe COVID-19 infection. On the other hand, the majority 96.05% of the COVID-19 patients without respiratory diseases were found in severe conditions, in comparison to 3.95% of the patients with respiratory diseases. In addition, 1.99% of the COVID-19

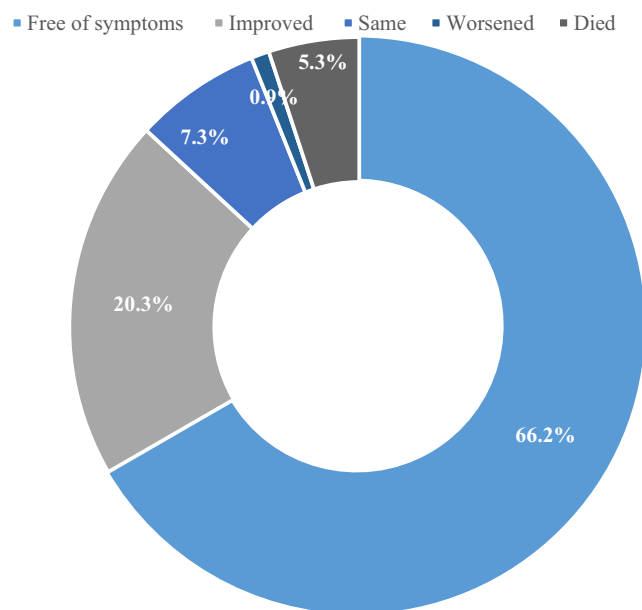


Figure 1 Outcome among studied patients.

patients with respiratory diseases were found in critical condition. These results reported a statistically significant association between the presence of respiratory diseases and COVID-19 severity ($\chi^2 = 13.102$; $p = 0.0004$) (Table 5).

Presence of Obesity and COVID-19 Severity Among Studied Patients

The current findings reported variation in the severity of COVID-19 according to the presence of obesity, as shown in Table 5. Nearly 535 of the COVID-19 patients with obesity reported mild symptoms, while 47.49% of the COVID-19 patients without obesity reported mild symptoms. Similarly, 50.89% of the obese COVID-19 patients reported moderate severity of the COVID-19 infection, in comparison to 49.11% of the non-obese COVID-19 patients. Similarly, 50.47% of the obese COVID-19 patients were found severe with COVID-19 infection in comparison to 49.53% of the patients without obesity. In this study, both categories of patients, obese (48.07%) and non-obese (51.93%) COVID-19 patients found in critical condition. These results reported an insignificant statistical association between the presence of obesity and COVID-19 severity ($\chi^2 = 3.013$; $p = 0.39$) (Table 5).

Outcome Among Studied Patients

With regard to the outcomes among studied patients, a total of 66.2% of the patients were free of symptoms, while 20.3% of the patients improved, followed by no change was observed among 7.3% of the patients, while 5.3% of them died and 0.9% of the patients were in a worse situation. Figure 1 shows the outcome of the COVID-19 among studied patients.

Discussion

In this study, dyspnea, fever, cough, muscle ache, sore throat, diarrhea, and vomiting were the most prevalent asymptomatic symptoms reported among chronic disease COVID-19 patients. These results were comparable to previous findings by Albanghali et al, 2022, Shu et al, 2021; Huluka et al, 2022.^{20–22} For instance, in a previous study in Saudi Arabia among COVID-19 Patients at Tertiary Care Hospital, Al Baha, where author reported that 77% of the patients were found to have symptomatic symptoms and 23% of them were asymptomatic.²⁰ However, Albanghali et al, 2022 studied the Clinical Characteristics and Treatment Outcomes of Mild to Moderate COVID-19 Patients and reported that 55% of the patients had a fever, followed by cough (43%), shortness of breath (61%), myalgia (28%), headache (27%), sore throat (15%) and GI symptoms (17%), respectively.²⁰

Similarly, another conducted in the Wuhan capital of China reported that 52.3% of the patients suffered from fever, while 70.4% of them had a cough, and dyspnoea was reported among 18.39% of the patients.²¹ Likewise, another study

among COVID-19 Patients at Eka Kotebe General Hospital, Addis Ababa, reported a high frequency of cough (69%), shortness of breath (44%), and fatigue (37%).²² Furthermore, in the current study, the comorbidities also contributed to the risk factor for COVID-19 infection, compared to the previous study.²⁰ In addition, very small percentages of the patients reported Chest heaviness, running nose, loss of taste, and loss of smell were reported. However, according to current findings, 19.1% suffered from severe symptoms, and 8.5% of patients suffered from, and critically severe symptoms.

The mean score of onset of symptoms before admission in days was 4.97 ± 5.625 , and the mean score of illness duration in days was 11.53 ± 14.573 . During the patient's admission, the mean temperature was 37.56 degrees Celsius (SD = 0.81), and the mean pulse rate was 82.86 degrees Celsius (SD = 16.41). These findings were somewhat similar to previous findings by Albanghali et al, who reported temperature with MD and IQR of (37, 37–37), heart rate (1.9%) with MD and IQR (of 81, 70–90), respiratory rate (11.6%) with MD and IQR (24.5, 20–82), Oxygen SAT 26% with MD and IQR (90, 21–94).²⁰ Prior studies suggested that age is the primary risk factor for the severity of COVID-19 disease, as it has been mentioned in some studies that elderly aged above 50 are more prone to be at higher risk of getting infections, while other studies claimed that individuals aged above 60 are known to be at high risk.^{20,23} The difference in the current findings compared to previous findings may be a result of the patient's chronic disease status, ethnicity, and prior history of infections.

The current findings revealed that the majority of the COVID-19 chronic disease patients (70%) appeared ill, with one-quarter appearing toxic. In terms of treatment outcome, 66.2% of patients were found to be symptom-free, while 20.3% of chronic disease COVID-19 patients improved. However, 5.3% of them died and 0.9% were in worse condition. However, the literature suggests that Body temperature is a complex and nonlinear variable that is influenced by a variety of internal and external variables. A healthy adult's body temperature is approximately 37.0 degrees Celsius. The average human body temperature is between 36.5 and 37.5 degrees Celsius.¹⁹ The hypothalamus regulates and maintains body temperature within a narrow thermodynamic range to optimize the synaptic transmission of biochemical reactions.²⁴

Patients with chronic conditions were more likely to get an infection, which multiplies the chances of severity, the number of hospital visits, the expense of healthcare, and the likelihood of morbidity and mortality.^{9,11,25,26} Furthermore, the literature also revealed that obesity and the presence of chronic diseases are considered a higher risk for getting COVID-19.^{25,27–30} Given the recent COVID-19 outbreak, it is imperative to comprehend the risk factors for symptom deterioration and identify the susceptible persons at higher risk for COVID-19 death. However, neglecting the management of chronic disease can lead to the disruption of health-related quality of life and increased risk of further morbidity or even mortality, related to ongoing viral pandemics.

In this study, most commonly identified chronic diseases among COVID-19 patients were obesity (50.8%) followed by diabetes (18.2%), hypertension (15.7%), Pneumonia, Cardiac disorders such as hyperlipidemia, respiratory disorders, and hypothyroidism. These results are consistent with other studies published with similar objectives showing that cardiovascular and endocrinological diseases were more prevalent among COVID-19 patients which resulted in increased severity of COVID-19-related death.^{9,11,30} Similarly, another study in Saudi Arabia reported diabetes mellitus (31%), hypertension (24%) pulmonary disease (7%), asthma (2.2%), and renal failure (1%) were the most common comorbidities among COVID-19 Patients.²⁰ While another study in Ethiopia reported Hypertension was the most prevalent comorbidity, followed by diabetes mellitus.²² Furthermore, there was evidence that all chronic health conditions were positively associated with an increased risk of COVID-19-related hospitalization and in-hospital mortality.^{31,32} More broadly, literature suggested that poor treatment outcomes among COVID-19 patients supported by the presence of chronic diseases such as Chronic pulmonary disease, asthma, chronic kidney disease, diabetic mellitus, HIV positive, worsening conditions, and age 55 and above years were statistically associated with poor treatment outcomes.³² These findings suggest the need to control and manage chronic diseases to improve the outcomes among COVID-19 patients.

In this study, severity was varied concerning the presence of chronic diseases. For instance, current findings reported that severity was higher among obese patients followed by diabetes and hypertension. These findings were similar to previous findings by Geng et al, who found that patients with chronic conditions like obesity were at a higher risk of experiencing severe symptoms of COVID-19.¹¹ Furthermore, cerebrovascular disease, chronic liver disease, chronic renal disease, or cancer were more likely to become worse infections and lead to raises severe COVID-19 and had a greater probability of mortality.¹¹ Similarly, another study by Yates et al among COVID-19 patients revealed an

association between obesity and chronic disease status that significantly differed by age group of the patients. Furthermore, previous findings revealed that older patients with obesity and chronic disease were associated with in-hospital mortality; however, survival of COVID-19 patients in those with obesity was similar to those with and without the prevalent chronic disease.³⁰ Older patients had a five times higher increased risk of hospitalization and mortality associated with COVID-19.³¹ Nowadays chronic diseases are more common everywhere in the world. About half of the COVID-19 patients in the current study are obese. Obesity is a risk factor for several cardiovascular illnesses, according to the literature. Therefore, it is crucial to advise patients and the general public to follow a healthy eating plan. Patients and individuals should also be suggested and counseled about the negative effects of unhealthy eating and sedentary activity.

In this study, the severity of COVID-19 was higher among males in comparison to female patients. Similarly, the COVID-19 severity was much higher among obese, diabetes, and hypertensive patients. These findings were comparable to previous findings published in other countries, by Semenzato et al, and Geng et al in 2021.^{11,31} For instance, Semenzato et al evaluated the association between sociodemographic comorbidity characteristics with an excess risk of COVID-19-related hospitalization in France and reported that men were at higher risk of COVID-19-related hospitalization mortality compared to women.³¹ Additionally, Semenzato et al reported higher mortality among COVID-19 patients with heart failure.³¹ Similarly, another study by Geng et al in 2021 reported that hypertension was the most common and was associated with higher severity among COVID-19 patients, increased intensive care unit admission, followed by acute respiratory syndrome, and led to mortality of the patients.¹¹

Similarly, Aslaner et al found that 36.8% of their COVID-19 patients with comorbidities like diabetes, respiratory diseases, and hypertension.²⁶ While Zhou et al among Chinese COVID-19 patients reported hypertension was the most prevalent comorbid condition, followed by respiratory tract diseases³³ which increased the severity of infection and mortality rates.^{26,33} Furthermore, studies also demonstrated that patients with chronic pulmonary disease posed a higher chance of COVID-19-related severity and mortality rates.^{20,33,34}

In this study, only 1.9% of the patients with asthma were critical. On the other hand, 3.9% of the COVID-19 patients with asthma were found to be severe, while Geng et al in a review of the predictors for the severity of COVID-19 revealed that respiratory disease such as asthma was associated with a reduced risk of COVID-19 mortality,²⁰ which is comparable to current findings. However, it is difficult to explain this observed lower risk, among COVID-19 patients with asthma. Although, on the one hand, we could hypothesize that some patients with respiratory illness might have less contact with the outside world, because their current situation is very similar to COVID-19 and would therefore be less likely to be infected with the SARS-CoV-2 virus, it is also possible that some patients, more particularly with asthma or any disease may have strictly adhered with public health recommendations.

According to the current findings, 5.3% of COVID-19 patients died, 0.9% of patients were in the worst condition, and 20.3% of patients showed improvements in their condition. The majority of patients were also found to be symptom-free (66.2%). These results were similar to earlier results by Aslaner et al, who sought to determine the impact of chronic diseases, age, and gender on morbidity and mortality of COVID-19 infection.²⁶ The results of this earlier study showed that 95.8% of the COVID-19 patients were alive 4.24% of them died.²⁶ However, in 2021 Yates et al conducted using data from the Clinical Characterization Protocol UK and included 27,624 COVID-19 patients and reported high rates of mortality such as 51.7% (n = 27624) of the total patients.³⁰ Yet, there are several limitations to this study. Despite its large sample size, this study was limited to a single region of Saudi Arabia, and therefore its conclusions cannot be applied to other parts of the country or worldwide. Second, only COVID-19 individuals with chronic illnesses were included; furthermore, there was no distinction made between patients with a single chronic illness and those with multiple. Moreover, as this is a retrospective study based on administrative data, reporting errors in COVID-19-related diagnosis or death may have happened, particularly in the early stages of the epidemic.

Conclusion

The current findings revealed that 66.2% of the COVID-19 patients with chronic diseases were free of symptoms, while 20.3% of them improved, followed by no change was observed among 7.3% of the patients, while 5.3% of them died and 0.9% of the patients were in a worse situation. The severity of COVID-19 was significantly associated with chronic

diseases; however, obesity was not significantly associated with COVID-19 in the studied patients. The results of this study allow medical practitioners to help COVID-19 patients with chronic diseases receive better care compared to people without such conditions, which lowers the chance of mortality and related adverse events. Additionally, medical practitioners must be more knowledgeable about the long-term illnesses that put patients at risk for serious COVID-19 challenges and mortality. Throughout the pandemic, those with persistent illnesses need to be proactive in protecting themselves.

Disclosure

The authors report no conflicts of interest in this work.

References

1. MOH. Saudi Arabia's Experience in Health Preparedness and Response to COVID-19 Pandemic. *Ministry Health Portal*. 2020;2020:1.
2. Wajid S, Samreen S, Sales I, Bawazeer G, Mahmoud MA, Aljohani MA. What has changed in the behaviors of the public after the COVID-19 pandemic? A cross-sectional study from the Saudi community perspective. *Front Public Health*. 2022;10. doi:10.3389/fpubh.2022.723229
3. Chu DK, Akl EA, Duda S, et al. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *Lancet*. 2020;395(10242):1973–1987. doi:10.1016/S0140-6736(20)31142-9
4. Bourouiba L. Turbulent gas clouds and respiratory pathogen emissions: potential implications for reducing transmission of COVID-19. *JAMA*. 2020;323(18):1837–1838. doi:10.1001/jama.2020.4756
5. Stachteas P, Symvoulakis M, Tsapas A, Smyrnakis E. The impact of the COVID-19 pandemic on the management of patients with chronic diseases in Primary Health Care. *Population Medicine*. 2022;4:1–13. doi:10.18332/popmed/152606
6. Hajat C, Stein E. The global burden of multiple chronic conditions: a narrative review. *Preventive Medicine Reports*. 2018;12:284–293. doi:10.1016/j.pmedr.2018.10.008
7. Wang H, Naghavi M, Allen C, et al. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388(10053):1459–1544.
8. Buttorff C, Ruder T, Bauman M. *Multiple Chronic Conditions in the United States*. Vol. 10. Rand Santa Monica, CA. 2017.
9. Hacker KA, Briss PA, Richardson L, Wright J, Petersen R. Peer reviewed: COVID-19 and chronic disease: the impact now and in the future. *Preven Chronic Dis*. 2021;18. doi:10.5888/pcd18.210086
10. Center for disease control and prevention. GLOBAL HEALTH. Available from https://www.cdc.gov/globalhealth/countries/saudi_arabia/default.htm. Last Accessed Aug 13, 2023.
11. Geng J, Yu X, Bao H, et al. Chronic diseases as a predictor for severity and mortality of COVID-19: a systematic review with cumulative meta-analysis. *Front Med*. 2021;8:588013. doi:10.3389/fmed.2021.588013
12. Ajebli M, Amssayef A, Akdad M, et al. Chronic diseases and Covid-19: a review. *Endocrine, Metabolic & Immune Disorders - Drug Targets*. 2021;21(10):1781–1803. doi:10.2174/1871530320666201201110148
13. Fang L, Karakiulakis G, Roth M. Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection? *Lancet Respir Med*. 2020;8(4):e21. doi:10.1016/S2213-2600(20)30116-8
14. Palmer K, Monaco A, Kivipelto M, et al. The potential long-term impact of the COVID-19 outbreak on patients with non-communicable diseases in Europe: consequences for healthy aging. *Aging Clin Experiment Res*. 2020;32(7):1189–1194. doi:10.1007/s40520-020-01601-4
15. Tisminetzky M, Delude C, Hebert T, Carr C, Goldberg RJ, Gurwitz JH. Age, multiple chronic conditions, and COVID-19: a literature review. *J Gerontol Ser A*. 2022;77(4):872–878.
16. Garg S, Kim L, Whitaker M, et al. Hospitalization rates and characteristics of patients hospitalized with laboratory-confirmed coronavirus disease 2019—COVID-NET, 14 States, March 1–30, 2020. *MMWR*. 2020;69(15):458. doi:10.15585/mmwr.mm6915e3
17. Richardson S, Hirsch JS, Narasimhan M, 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. doi:10.1001/jama.2020.6775
18. Justino DCP, Silva DFO, Costa KTDS, de Moraes TNB, de Andrade FB. Prevalence of comorbidities in deceased patients with COVID-19: a systematic review. *Medicine*. 2022;101(38):e30246. doi:10.1097/MD.00000000000030246
19. Hernández-Galdamez DR, González-Block MÁ, Romo-Dueñas DK, et al. Increased Risk of Hospitalization and Death in Patients with COVID-19 and Pre-existing Noncommunicable Diseases and Modifiable Risk Factors in Mexico. *Arch Med Res*. 2020;51(7):683–689. doi:10.1016/j.amed.2020.07.003
20. Albanghali M, Alghamdi S, Alzahrani M, et al. Clinical characteristics and treatment outcomes of mild to moderate COVID-19 patients at tertiary care hospital, al baha, Saudi Arabia: a single centre study. *J InfectionPublic Health*. 2022;15(3):331–337. doi:10.1016/j.jiph.2022.02.001
21. Shu L, Wang X, Li M, et al. Clinical characteristics of moderate COVID-19 patients aggravation in Wuhan Stadium Cabin Hospital: a 571 cases of retrospective cohort study. *J Med Virol*. 2021;93(2):1133–1140. doi:10.1002/jmv.26414
22. Huluka DK, Etissa EK, Ahmed S, et al. Clinical Characteristics and Treatment Outcomes of COVID-19 Patients at Eka Kotebe General Hospital, Addis Ababa, Ethiopia. *American JTrop Med Hyg*. 2022;107(2):252. doi:10.4269/ajtmh.21-1270
23. Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA*. 2020;323(18):1775–1776. doi:10.1001/jama.2020.4683
24. Johansson A. Core Temperature-The Intraoperative Difference Between Esophageal Versus Nasopharyngeal Temperatures and the Impact of Prewarming, Age, and Weight. *AANA J*. 2019;87(1):6.
25. Williamson EJ, Walker AJ, Bhaskaran K, et al. Factors associated with COVID-19-related death using OpenSAFELY. *Nature*. 2020;584(7821):430–436. doi:10.1038/s41586-020-2521-4
26. Aslaner H, Aslaner HA, Gökçek MB, Benli AR, Yıldız O. The effect of chronic diseases, age and gender on morbidity and mortality of COVID-19 infection. *Iran J Public Health*. 2021;50(4):721. doi:10.18502/ijph.v50i4.5996

27. Docherty AB, Harrison EM, Green CA, et al. Features of 20 133 UK patients in hospital with covid-19 using the ISARIC WHO Clinical Characterisation Protocol: prospective observational cohort study. *BMJ*. 2020;369:1.
28. Seidu S, Gillies C, Zaccardi F, et al. The impact of obesity on severe disease and mortality in people with SARS-CoV-2: a systematic review and meta-analysis. *Endocrinol Diabetes Metabol*. 2021;4(1):e00176. doi:10.1002/edm2.176
29. Singh AK, Gillies CL, Singh R, et al. Prevalence of co-morbidities and their association with mortality in patients with COVID-19: a systematic review and meta-analysis. *Diabetes Obesity Metab*. 2020;22(10):1915–1924. doi:10.1111/dom.14124
30. Yates T, Zaccardi F, Islam N, et al. Obesity, chronic disease, age, and in-hospital mortality in patients with covid-19: analysis of ISARIC clinical characterisation protocol UK cohort. *BMC Infect Dis*. 2021;21(1):1–9. doi:10.1186/s12879-021-06466-0
31. Semenzato L, Botton J, Drouin J, et al. Chronic diseases, health conditions and risk of COVID-19-related hospitalization and in-hospital mortality during the first wave of the epidemic in France: a cohort study of 66 million people. *Lancet Reg Health-Eur*. 2021;8:100158. doi:10.1016/j.lanepe.2021.100158
32. Kaso AW, Hareru HE, Kaso T, Agero G. Factors associated with poor treatment outcome among hospitalized COVID-19 patients in South Central, Ethiopia. *Biomed Res Int*. 2022;2022:1.
33. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*. 2020;395(10229):1054–1062. doi:10.1016/S0140-6736(20)30566-3
34. Al-Rawi MB, Alobaid AM, Al-wathinani AM, Alameen AA, Syed W. Evaluation of knowledge on the preventive practice of COVID-19 among middle-aged adults in Saudi Arabia—a cross-sectional questionnaire based study. *Prevent Control*. 2022;70(11):890–896. doi:

Risk Management and Healthcare Policy

Publish your work in this journal

Risk Management and Healthcare Policy is an international, peer-reviewed, open access journal focusing on all aspects of public health, policy, and preventative measures to promote good health and improve morbidity and mortality in the population. The journal welcomes submitted papers covering original research, basic science, clinical & epidemiological studies, reviews and evaluations, guidelines, expert opinion and commentary, case reports and extended reports. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/risk-management-and-healthcare-policy-journal>

Dovepress
Taylor & Francis Group