

Clinical Profile and Outcomes of Hospitalized COVID-19 Patients in Hadhramout: One-Month Review (May–June 2020)

Amgad M. Munassar

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Abstract

Introduction: The COVID-19 pandemic has posed a significant challenge globally, particularly in conflict-affected and resource-limited settings such as Yemen. With an already fragile healthcare system, Yemen's response to the pandemic has been hindered by prolonged conflict, health infrastructure collapse, and insufficient surveillance. This study aimed to assess the clinical characteristics and outcomes of hospitalized COVID-19 patients in Hadramout Governorate, Yemen, to provide insights into mortality patterns and factors associated with severe disease.

Methods: A retrospective cross-sectional study was conducted using data from 302 laboratory-confirmed COVID-19 cases admitted to isolation unit in Hadramout Governorate between May and June 2020. Data were retrieved from verified records maintained by the Ministry of Public Health and Population (MoPHP). Demographic variables, comorbidities, presenting symptoms, and clinical outcomes (discharge, ongoing treatment, death) were analysed using SPSS version 23.0, with results presented as frequencies and percentages.

Results: The highest percentage were males (67.5%), aged 45–69 years (52.6%). Those aged 70 years and above, exhibited higher mortality rates, with deaths reaching 47.8% among those aged 70–84 years and 46.2% in those 85 years and older. Common comorbidities included pneumonia (52.0%), hypertension (33.1%), diabetes mellitus (26.5%), and cardiovascular diseases (16.2%). Fever (86.8%), difficulty breathing (76.5%), and cough (73.8%) were the predominant presenting symptoms. Males accounted for 75% of all deaths. Overall, advanced age and the presence of comorbidities were associated with increased mortality.

Conclusion: This study highlights that older age, male gender, and underlying chronic comorbidities among hospitalized COVID-19 patients are major characteristics linked to poor COVID-19 outcomes. The findings underscore the urgent need for targeted preventive and therapeutic strategies, especially in current health system, to mitigate the impact of future outbreaks and pandemics. Strengthening primary healthcare services and healthcare capacity is critical to improve clinical outcomes in conflict-affected settings.

Keywords: COVID-19, Mortality, Comorbidities, Yemen, Hadramout, Clinical Outcomes.

Master in Public Health, Yemeni Council for Medical and Health Specializations, Aden

Corresponding Author: Amgad Mohammed Munassar Email: amgedmonser@gmail.com

الخصائص السريرية ونتائج علاج مرضى كوفيد-19 المصابين في حضرموت: مراجعة لمدة شهر (مايو-يونيو 2020)

أمجد منصر

ملخص الدراسة

المقدمة: شكّلت جائحة كوفيد-19 تحدياً كبيراً على مستوى العالم، خاصةً في البلدان المتأثرة بالصراعات والمحدودة الموارد مثل اليمن. ومع نظام صحي هش أصلاً، تعثرت استجابة اليمن للجائحة بسبب الصراع المستمر، وإنهيار البنية التحتية الصحية، وضعف أنظمة الترصد. هدفت هذه الدراسة إلى تقييم الخصائص السريرية والنتائج الصحية لمرضى كوفيد-19 الذين تم إدخالهم إلى المستشفيات في محافظة حضرموت، اليمن، لتقديم رؤى حول أنماط الوفيات والعوامل المرتبطة بحالات المرض الشديدة.

المنهجية: أجريت دراسة مقطعية عرضية استرجاعية باستخدام بيانات 302 حالة مؤكدة مخبرياً لكوفيد-19 تم إدخالها إلى وحدات العزل في محافظة حضرموت بين مايو ويونيو 2020. تم جمع البيانات من سجلات موثقة تحتفظ بها وزارة الصحة العامة والسكان. شملت البيانات المتغيرات الديموغرافية، الأمراض المصاحبة، الأعراض السريرية، والنتائج العلاجية (الخروج، العلاج الجاري، الوفاة). تم تحليل البيانات باستخدام برنامج الإحصاء SPSS الإصدار 23.0، وعُرضت النتائج على شكل تواتر ونسب مئوية.

النتائج: كانت النسبة الأكبر من الحالات من الذكور (67.5%)، والفئة العمرية بين 45-69 سنة (52.6%). أظهر من هم في سن 70 سنة فأكثر معدلات وفيات أعلى، حيث بلغت الوفيات 47.8% في الفئة العمرية 70-84 سنة، و46.2% في الفئة العمرية 85 سنة فأكثر. من أهم الأمراض المصاحبة الشائعة كان الالتهاب الرئوي (52.0%)، ارتفاع ضغط الدم (33.1%)، داء السكري (26.5%)، وأمراض القلب والأوعية الدموية (16.2%). وكانت الحمى (86.8%)، وصعوبة التنفس (76.5%)، والسعال (73.8%) من الأعراض السائدة. وشكّل الذكور 75% من إجمالي الوفيات، مما يشير إلى زيادة خطر الوفاة مقارنةً بالإناث. وبشكل عام، ارتبط التقدم في السن ووجود الأمراض المصاحبة بزيادة معدلات الوفاة.

الخلاصة: تُبرز هذه الدراسة أن التقدم في العمر، والجنس الذكري، والأمراض المصاحبة تُعد من أبرز العوامل المؤثرة لضعف المخرجات بين مرضى كوفيد-19 في اليمن. وتؤكد النتائج على الحاجة الملحة لاستراتيجيات وقائية وعلاجية هادفة، خاصةً في الأنظمة الصحية الهشة، للتخفيف من تأثير الفاشيات المستقبلية. كما أن تعزيز أنظمة الترصد وبناء القدرات الصحية أمر بالغ الأهمية لتحسين النتائج السريرية في البيئات المتأثرة بالصراعات.

كلمات مفتاحية: كوفيد-19، الوفيات، الأمراض المصاحبة، اليمن، حضرموت، النتائج السريرية.

ماجستير الصحة العامة، المجلس اليمني للتخصصات الطبية والصحية، عدن

Introduction

The emergence of the novel coronavirus disease (COVID-19) in December 2019 led to a global pandemic with profound public health implications. By 2023, COVID-19 had infected over 80 million individuals and resulted in more than one million deaths across over 190 countries worldwide [1,2]. The predominant mode of transmission is believed to occur via respiratory droplets expelled when infected individuals cough, sneeze or speak [3]. Importantly, transmission is not limited to symptomatic individuals; asymptomatic and presymptomatic carriers can also spread the virus [4].

In Yemen, a country devastated by a protracted conflict now entering its tenth year, the pandemic has added significant strain to an already fragile healthcare system. Following the expiration of a temporary truce in 2022, efforts toward a lasting political resolution remain uncertain. The conflict has caused widespread destruction, rendering approximately 50% of health facilities either fully or partially non-functional due to war-related damage [5].

Yemen is highly susceptible to infectious disease outbreaks and has faced repeated epidemics of cholera, measles, diphtheria, dengue fever, and polio in recent years [6,7]. These outbreaks are driven by the collapse of public health infrastructure, widespread water scarcity, and increasing vaccine hesitancy. As of 2023, approximately 70% of children under three years old in Yemen had not received a full course of routine

immunizations [8]. As a result, the country continues to experience a resurgence of vaccine-preventable diseases, including acute watery diarrhea, measles, pertussis, polio, and diphtheria.

Yemen's first confirmed case of COVID-19 was officially reported by the Ministry of Public Health and population (MOPHP) on 10th April 2020 [9]. While available data suggest a peak in mortality during the early phase of the pandemic, the lack of robust surveillance has hindered accurate estimations of death trends [10]. Clinically, COVID-19 in Yemen presents with nonspecific symptoms, most commonly fever, cough, fatigue, and myalgia [11]. Among laboratory-confirmed cases, individuals with comorbidities had poorer outcomes, and disease severity increased with the number of pre-existing conditions [12]. However, there remains a paucity of data on the prognostic indicators for COVID-19 patients admitted to intensive care units (ICUs) in Yemen, particularly regarding symptomatology, comorbidities, and length of hospital stay. Therefore, this analysis aimed to assess the clinical characteristics and outcomes of hospitalized COVID-19 patients in Hadramout Governorate, Yemen, to provide insights into mortality patterns and risk factors associated with severe disease.

Methods

Study design and setting

This is a retrospective cross-sectional study analyzed data from all COVID-19 patients admitted to the isolation unit in Hadramout. Data were obtained from verified medical

records maintained by the Surveillance Department of the MOPHP. These records were initially collected by the Health Rapid Response Team and the Surveillance Department during the peak period of the COVID-19 outbreak in 2020 between May and June.

Target population

Patients admitted to the isolation unit in Hadramout within May-June 2020 excluding COVID-19 cases which were admitted to the private sector hospitals.

Data collection

Data collected from surveillance sheet were used to retrieve the demographic (gender, age), patients' comorbidities (arterial hypertension (AHT), diabetes mellitus (DM), cardiovascular diseases (CVD), Chronic lung, liver and kidney diseases), presenting symptoms, and clinical outcomes (ICU admission, recovery and death).

Statistical analysis

Data were systematically verified and checked for errors and entered into the Statistical Package for Social Sciences (SPSS), version 23.0 for analysis. Categorical variables are

presented as frequencies. Quantitative variables were presented as means and standard deviations (SD).

Ethical consideration

Permission was given from the MOPHP, Curative Health Care Sector based on an official letter from the Yemeni Council of Medical Specialization-Aden. No other ethical requirement needed in the conduct of this study. Informed consent was not needed because only anonymized routine record-based data were analyzed retrospectively.

Results

The analysis of 302 hospitalized COVID-19 cases in isolation units across Hadramout reveals a prominent age-related trend. The largest proportion (52.6%) of cases falls within the 45–69 years age group, followed by those aged between 70- and 84 years group (22.2%) while younger age groups such as those aged less than 15 show very low percentages (only 2 of 302 or 0.6%). From table 1, it is also clear that male cases account for a higher proportion (67.5%) compared to females (32.5%).

Table 1: Characteristic of Studied Hospitalized COVID-19 Cases in Hadramout (n=302)

Characteristics	No.	%
Age Groups in Years		
<15	2	0.6
15<30	12	4
30-<45	49	16.2
45-<70	159	52.6
70-<85	67	22.2
85& more	13	4.3
Gender		
Male	204	67.5%
Female	98	32.5%

The data presented in Table 2 provide a comprehensive overview of the clinical manifestations, comorbidities, and outcomes among 302 hospitalized COVID-19 patients in Hadramout, Yemen. The most reported symptom among hospitalized cases fever (86.8%) of patients. Difficulty in breathing was reported in 76.5% of cases, and cough was present in 73.8%. Other symptoms reported include muscle and joint pain (28.1%), sore throat (15.2%), shortness of breath (10.3%).

Regarding the most common comorbidities, the table also shows that pneumonia was the most common reported comorbidity (52.0%) among hospitalized COVID-19 patients. Other notable conditions include AHT at 33.1% and Diabetes Mellitus at 26.5%.

The highest percentage (56.6%) of hospitalized COVID-19 cases were still under treatment at the time of data extraction, while 12.9% were discharged and 30.5% died.

Table 2: Distribution of Studied Hospitalized COVID-19 Cases in Hadramout by their Clinical Manifestations, Comorbidities and Outcomes (n=302)

Characteristics and Clinical Manifestations	No.	%
High temperature	262	86.8
Difficulty in breathing	231	76.5
Cough	223	73.8
Muscle and joint pain	85	28.1
Sore throat	46	15.2
Shortness of breath	31	10.3
Comorbidities		
Pneumonia	157	52.0
Atrial Hypertension	100	33.1
AHT	80	26.5
Diabetes Mellitus	49	16.2
Cardiovascular disease	39	12.9
Chronic lung disease	37	12.3
Kidney disease	35	11.6
Liver diseases		
Outcomes		
Discharged	39	12.9
Under treatment	171	56.6
Dead	92	30.5

Table 3 presents the outcomes of hospitalized COVID-19 cases in Hadramout Governorate, Yemen, stratified by age group and gender showing the proportions of patients who were discharged, remained under treatment, or died. When looking at outcomes across age groups, there is a clear trend showing that older age is

linked with the highest mortality which observed in patients aged 70-<85 years (47.8%) who terminated in death, followed by those aged 85 and more (46.2%). Among those cases aged between 45-<70 years and 30 <45 years, 26.4% and 22.4% respectively were died during the hospitalization time.

Gender-wise, among hospitalized male cases 54.9%, 33.8% and only 11.3% of them during the time of data extraction were still under treatment,

died and discharged respectively, while among female cases 60.2% were still under treatment, 23.5% died and 16.3% of them were discharged.

Table 3: Outcomes of Studied Hospitalized COVID-19 Cases in Hadramout by Age Group and Sex (n=302)

Characteristics	Outcomes*					
	Discharged (n=39)		Undertreatment (n=171)		Died (n=92)	
	No.	%	No.	%	No.	%
Age (years)						
85 & more (n=13)	0	0.0	7	53.9	6	46.1
70-<85 (n=67)	6	8.9	29	43.3	32	47.8
45-<70 (n=159)	25	15.7	92	57.9	42	26.4
30-<45 (n=49)	8	16.3	30	61.2	11	22.4
15-<30 (n=12)	0	0.0	11	91.6	1	8.4
0-<15 (n= 2)	0	0.0	2	100.0	0	0.0
Gender						
Male (n=204)	23	11.3	112	54.9	69	33.8
Female (n=98)	16	16.3	59	60.2	23	23.5

* Percentages were taken from row totals

Table 4 illustrates the frequency of deaths among hospitalized COVID-19 patients with comorbidities while admitted to isolation unit. Of those patients with chronic lung diseases, cardiovascular diseases, kidney diseases, liver diseases and AHT

41.0%, 38.8%, 37.8%, 34.3% and 34.0 of them respectively were died while 29.9% and 28.8% of those with pneumonia and diabetes mellitus respectively were died.

Table 4: Frequency of Deaths among Studied Hospitalized COVID-19 Cases with Comorbidities (n=302)

Comorbidities	Died admitted COVID-19 cases (n=92)*	
	No.	%
Pneumonia (n=157)	47	29.9
Arterial Hypertension (n=100)	34	34.0
Diabetes Mellitus (n=80)	23	28.8
Cardiovascular Diseases (n=49)	19	38.8
Chronic Lung Diseases (n=39)	16	41.0
Kidney Diseases (n=37)	14	37.8
Liver Diseases (n=35)	12	34.3

* Percentages were taken from row totals

Discussion

The present study highlights that COVID-19 mortality in Yemen, specifically in Hadramout Governorate, shares common patterns with global trends while also reflecting the challenges unique to fragile healthcare settings. The overall mortality rate among admitted patients was 30.5%, with deaths disproportionately affecting older adults, particularly those aged 70 years and above, and males. Several countries showing the same findings, where age over 65 and male gender have been consistently identified as linked of COVID-19 mortality [13].

Chronic lung disease was linked with the highest mortality rate (41.0%) among the assessed comorbidities, which is consistent with studies identifying chronic obstructive pulmonary disease (COPD) as a major risk for severe COVID-19 outcomes that highlights COPD and other pulmonary conditions as significant predictors of adverse COVID-19 outcomes [14].

Cardiovascular disease (38.8%) and chronic kidney disease (37.8%) were also associated with notably high mortality rates in this cohort, supporting findings from previous studies that have consistently demonstrated a correlation between these comorbidities and increased risk of death among hospitalized COVID-19 patients [15,16].

In this study, HTN (34.0%) and liver diseases (34.3%) were associated with notably high mortality rates among hospitalized COVID-19

patients. These findings are consistent with global research linking such comorbidities to heightened disease severity and adverse clinical outcomes. The observed trends further reinforce evidence that chronic conditions can exacerbate COVID-19 progression, likely due to impaired immune regulation and pre-existing organ dysfunction [17,18].

The findings of the present study reaffirm previous smaller-scale observations from Yemen during the early phase of the pandemic, where mortality was concentrated among older adults with chronic illnesses [19]. The country's fragile health infrastructure—where nearly half of facilities are non-functional—likely exacerbated outcomes, limiting access to critical care and timely interventions [20]. These findings collectively highlight the significant impact of comorbidities on the severity and management of COVID-19. The high prevalence of chronic comorbidities among fatalities reflects global patterns, where individuals with non-communicable diseases face a markedly increased risk of severe illness and death [12,14,16]. In Yemen's weakened healthcare system—undermined by years of conflict and disjointed management of chronic diseases—likely intensifies disease severity and shapes patterns of hospital admissions [20].

Strengths and Limitations

One of the main strengths of the study lies in its focus on Yemen, a country where limited epidemiological data exists due to prolonged conflict and a weakened health system. The study provides valuable insights into demographic characteristics, clinical manifestations, comorbidities, and outcomes of COVID-19 patients in Hadramout during the early peak of the pandemic.

However, several limitations should be acknowledged. First, the study relies solely on data from public isolation units, excluding patients treated in private facilities, which may lead to selection bias and limit generalizability. Second, the retrospective design and reliance on surveillance records may be subject to incomplete data reporting or variability in clinical assessments. Additionally, the lack of multivariate analysis limits the ability to assess independent predictors of mortality or ICU admission. The discussion, while informative, could benefit from a more critical reflection on these methodological limitations. Despite these limitations, the manuscript provides important baseline data for future studies and policy planning in humanitarian and post-conflict settings.

Conclusion

This study underscores that COVID-19 mortality in Hadramout follows global patterns but occurs at higher rates due to systemic healthcare fragility. Our results emphasize the urgent need for preparedness planning in Yemen to mitigate future

outbreaks. Strengthening hospital readiness, improving chronic disease management, and ensuring functional ICU capacity are critical to reducing death rates in future epidemics. Proactive resource allocation and strategic planning are essential to ensure proper readiness in a country where pandemic shocks have amplified existing vulnerabilities.

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