Clinical characteristics of confirmed cases of COVID-19 admitted at Al-Nahdha hospital, Oman: a cross-sectional descriptive study

Saud Al Harthi (smsbar07@gmail.com)
Ministry of Health, Oman https://orcid.org/0000-0002-5457-4662
Magdi AlOsali
Ministry of Health, Oman
Ruwaida Al Ismaili
Ministry of Health, Oman
Sultan Al Lawati
Ministry of Health, Oman
Bina Kamble
Ministry of Health, Oman
Mustafa Al Shaaibi
Ministry of Health, Oman
Nasser Al kindi
Ministry of Health, Oman
Salim Al Qasabi
Ministry of Health, Oman
Mohamed Al Hinai
Ministry of Health, Oman
Hamad Al Harthi
Ministry of Health, Oman
Thamra Al Ghafri
Ministry of Health, Oman

Research Article

Keywords: COVID-19, Oman, clinical, characteristics, critical care

Posted Date: July 7th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-39988/v1

Abstract

Background:

With the coronavirus disease 19 (COVID-19) pervading the world, little has been published regarding the hospitalized cases of COVID-19 (confirmed) in the Arabian Gulf countries. This paper describes the socio-demographic, clinical, laboratory, and radiological characteristics, treatment and clinical outcomes of these cases in Al-Nahdha hospital, Oman. Additionally, factors associated with requiring critical care were identified.

Methods:

Data of all the positive cases in Al-Nahdha hospital were retrieved from the electronic health information system retrospectively from 3rd of March to 9th May 2020. Required information was recorded in a bespoke sheet and exported to SPSS for further analysis. The primary outcome was defined as requiring vs not requiring critical care.

Results:

Out of 102 total admissions, 19 cases required critical care (18.6%). Compared to the non-critical cases, majority of the severe cases requiring critical care were older [54.1(13.4) years vs 48.9(14.9) years], males [89.5% vs 74.7%] and non-nationals [63.2 vs 55.4%]. Significant factors associated with requiring critical care were symptoms of shortness of breath (89.5% vs 65.1%, P=0.03), diabetes (68.4% vs 32.5%, OR=1.5, P=0.004), chronic artery disease (15.8% vs 3.6%, OR=1.7, P=0.04), diagnosis of ARDS (63.2% vs 6.0%, P<0.001). Additionally, the mean ferritin levels was significantly higher in cases requiring critical care compared to their counter cases (2350.4(423.8) vs 795.7(554.3), P=0.005). Depending on disease severity, treatment included anti-bacterial, anti-viral, heparin and steroids. The utilization of steroids was significantly higher in the cases requiring critical care (63.2% vs 26.5%, P=0.001). Out of cases who required critical care (n=19), nine died (death rate= 47.4%).

Conclusions:

Results from this study provides fundamental information about the non-clinical and clinical characteristics of confirmed COVID-19 cases in Oman. The information obtained can be utilized to follow up the clinical progress of hospitalized patients with COVID-19 in the Arabic speaking countries where such reports are limited.

Introduction

The World Health Organization (WHO) has recently declared Corona virus disease 2019 (COVID–19) as a public health emergency of international concern (World Health Organisation, 2020). As of 12th June, 2020, a total of 7503193 laboratory-confirmed cases had been reported globally with 421289 deaths.

COVID –19 emerged in Wuhan city in December 2019 and rapidly spread worldwide [1]. The causing pathogen was identified in samples of bronchoalveolar lavage fluid from a patient in Wuhan and was confirmed as the cause of COVID –19. The full-genome sequencing showed that this pathogen/virus is a distinct from the beta corona viruses associated with human severe acute respiratory syndrome corona virus (SARS-CoV–2) [2]. It has been reported that bats were the primary source of this virus. However, current evidence suggests spread to humans via transmission from wild animals illegally sold in the Huanan Seafood Wholesale Market [3].

Despite mild symptoms from beta corona viruses, more than 10000 cumulative cases were caused by the SARS-CoV (mortality rates of 10%) [4] and Middle East respiratory syndrome corona virus (MERS-CoV) (mortality rates of 37%) [5] in the last 20 years. In recent studies, symptoms of infections by COVID–19 were similar to that of SARS-Co [2], however, the presentation of COVID–19 disease is not fully understood [6]. Reported patients' clinical manifestations include fever, non-productive cough, dyspnoea, fatigue, myalgia, normal or decreased leukocyte counts, and radiographic evidence of pneumonia. Organ dysfunction and death can occur in severe cases [2].

Oman, similar to all the countries globally, responded to the alert from WHO about the rapid spread of this virus in February 2020. The first case of COVID–19 was identified on the 23rd of February linked to travel from a nearby country. As of 12th June, 2020, 21071 cases were identified with 7489 recoveries and 96 deaths [7].

Several prompt interventions were undertaken by the Ministry of Health in Oman. According to the national COVID–19 guidelines for Muscat governorate [7], mild and moderate cases are admitted in Al-Nahdha hospital. Department of medicine in Al-Nahdha hospital (a secondary care hospital for medical services) in Muscat Governorate receives referred patients from all the primary care centres (government and private) and the emergency department within the hospital. The department has 40 beds in which six are considered as high dependency care beds for critically sick cases. Due to unavailability of intensive care services, patients requiring critical care/ventilators were all moved to another tertiary hospital, the Royal Hospital or Sultan Qaboos University Hospital (SQUH).

Evidence from China reported several characteristics of hospitalized cases including variations in symptoms, radiological and laboratory findings [8]. The exact clinical spectrum of hospitalized patients with COVID–19 in Oman is currently unknown. Hence, the aim of this study was to describe the demographic, clinical, laboratory, radiological, and treatment history of all COVID–19 in-patients at Al-Nahdha hospital from 3rd of March to 9th of May 2020. Additionally, this study has looked at factors associated with severity defined as patients requiring critical care (transferred to another hospital for critical care services).

Methods

Study design

This is a retrospective descriptive study about the COVID–19 confirmed cases in Al-Nahdha hospital. All admitted adult patients with COVID–19 (confirmed cases) from 3rd of March to 9th May 2020 were included. Covid–19 was diagnosed on the basis of WHO interim guidance (World Health Organisation, 2020). A Covid–19 confirmed case was defined as a positive result of real-time reverse-transcriptase–polymerase-chain-reaction (RT-PCR) assay of nasal and pharyngeal swab specimens [2]. Only laboratory-confirmed cases were included in the analysis. Data was reviewed and analyzed by a research team from the Department of Medicine.

Data sources/ measurement

The hospital health information system 'Al Shifa system' was used as the main source of data (supplementary file 1). The data was reviewed by a trained team of clinical researchers. Information recorded included:

Demographic data: age, gender, nationality, employment, and referring institute

Risk factors: history of travel, smoking and alcohol consumption, obesity, medical history of co-morbidities (diabetes, hypertension, coronary artery disease (CAD), asthma, Chronic Kidney Disease (CKD), Heart failure (HF), and any other chronic diseases.

Symptoms: headache, fever, sneezing, cough, shortness of breath, sore throat diarrhoea, loss of smell, loss of taste, body aches, and others.

Laboratory reports: Complete blood count (CBC), C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), D-Dimer, Troponin T, lactate dehydrogenase (LDH), Ferritin, liver function tests [alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), bilirubin, and creatinine.

Radiology reports: chest x-ray (CXR)

Given diagnosis: pneumonia and Acute Respiratory Distress Syndrome (ARDS) according to the national clinical management pathways for hospitalized patients with COVID 19.[7]

Treatment measures: antibiotics, antiviral therapy, corticosteroid therapy, respiratory support and other supportive therapies according to the Covid–19 national guideline.

Hospital stay was calculated from the day of admission in Al-Nahdha hospital to the day of discharge or transfer to another tertiary care hospital for critical care.

Ethics

Ethical approval was obtained from the Regional Research Committee in the Ministry of Health in Oman (supplementary file 2). All methods were performed in accordance with the guidelines and regulations from the Ministry of Health, Oman. Data was collected from the existing electronic hospital information system and thus informed consents were not applicable.

Statistical Analysis

Frequency tables [mean, and interquartile range (IQR) values] were used to describe continuous variables. The categorical variables were described as frequency rates and percentages. The dependent variable on severity was divided to “severe” if patients required critical care or “non-severe” if they did not require critical care. Differences in proportions of “severe” and “not severe” cases were compared across the studied variables. Except for age, duration of symptoms pre-diagnosis and hospital stay, all other variables were dichotomized into two categories based on the national guidelines and cut off points. CXR was categorized to normal, unilateral or bilateral infiltrates. Average point statistical imputations were used for missing laboratory data. For comparisons of means between two independent continuous samples, t-test was used when the data were normally distributed. Proportions for categorical variables were compared using χ^2 test, although the Fisher exact test was used when the data were limited. All statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 22 software (SPSS Inc). A 2-sided α of less than 0.05 was considered statistically significant.

Patient and Public Involvement

There was no involvement from the patients or public in setting the research question or the outcome measures, nor were they involved in developing plans for design or implementation of the study. No patients were asked to advise on interpretation or writing up of results. However, results from this study will be disseminated via the national social media platforms used by the Oman Ministry of Health.

Results

Trend of admissions from 3rd of March to 9th of May

The first admission of a COVID−19 confirmed case in Al-Nahdha hospital was on the 3rd of March 2020. The number of admissions varied from minimum of one to maximum of 7 per day (Figure 1). At the end of study period, out of 102 COVID−19 admitted cases, 18.6% (n = 19) required critical care and were transferred to other tertiary hospitals vs 81.4% (n = 83) were discharged from Al-Nahdha hospital. Mean duration of hospital stay was 6.1(3.4) days [3.7(2.1) days in those requiring critical care vs 6.7 (3.5) days in those not requiring critical care (P<0.001)]. Notably, out of the 19 severe cases (those who required critical care), nine died (fatality rate = 8.8%) and two patients were still under critical care at the end of data collection for this study.

Demographic data:

The mean age of this population was 49.9(14.7) years (Table 1). Patients who required critical care were older than those who did not require critical care [mean age was 54.1(13.4) vs 48.9(14.9) respectively], however this difference was not statistically significant (P = 0.1). Majority of patients were males 77.5% (n = 79) and more than half were non-nationals 56.9% (n = 58). Although not statistically significant, the proportion of expatriates requiring critical care was higher than their Omani counter parts (63.2% vs 36.8%, P = 0.6).

Forty-six percent of the cases were from India (23%) and Bangladesh (22%) vs 43.1% Omanies. Others were from Pakistan (9.0%), Iran (2.0%) and Lebanon (1%) (Figure 2). Data on occupation was missing for almost half of the population, however, 36.3% of the population reported being employed.

Most of the cases were referred from primary health care centres (PHC) (65.7%). Other referrals were from the private health sectors (14.7%), quarantine institutions (4.9%), arrivals from Muscat international airport (2.0%), and emergency department (12.8%).

Risk factors

Most patients had no history of travel to COVID–19 outbreak countries (84.3%). Majority of the patients were non-smokers (85.3%) and non-alcohol consumers 89(87.3%). Obesity was reported in only 15.7% of patients.

Co-morbidities

More than third of patients had diabetes (39.2%). The proportion of patients with diabetes among those who required critical care was higher than those who did not require critical care (68.4% vs 32.5%) and this difference was statistically significant (P = 0.004). Patients with diabetes had higher odds of requiring critical care by 1.5 times compared to their counter group (Table 1). Similarly, Patients with Coronary Artery Disease (CAD) had 1.7 times higher odds of requiring critical care compared to their counter group. Presence of other co-morbidities such as hypertension (36.3%), Chronic kidney disease (CKD) (4.9%) asthma (1.0%), presence of old TB (1.0%) and HIV (1.0%) were all not significantly associated with requiring critical care.

Table 1: Socio-demographic characteristics, risk factors and co-morbidities of COVID-19 confirmed cases in Al-Nahdha hospital

N (%)	Total population (n=102)	Not requiring critical care (n=82)	Requiring critical care (n=19)	P value
Socio-demographics				
Age Mean(SD),[quartiles]	49.9 (14.7), [36.0, 49,0, 61.3]	48.9 (14.9), [36.0,48.0,61,0]	54.1(13.4), [42.0,53.0,66.0]	0.1
Gender				0.2
Male	79(77.5)	62(74.7)	17(89.5)	
Female	23(22.5)	21(25.3)	2(10.5)	
Nationality				0.6
Omani	44(43.1)	37(44.6)	7(36.8)	
Expatriates	58(56.9)	46(55.4)	12(63.2)	
Occupation				0.3
un employed	9(8.8)	9(10.9)	0	
Employed	37(36.3)	29(34.9)	8(42.1)	
Missing	56(54.9)	45(45.8)	11(57.9)	
Referred from				0.7
PHC	67(65.7)	55(66.3)	12(63.2)	
Non-PHC	35(34.3)	28(33.7)	7(36.8)	
Risk factors				
History of travel				0.1
No travel	86(84.3)	67(80.7)	19(100)	
Travel	7(6.9)	7(8.4)		
Missing	9(8.8)	9(10.8)		
Smoking				0.9
No	87(85.3)	71(85.5)	16(84.2)	
Yes	5(4.9)	4(4.8)	1(5.3)	
Alcohol				0.7
No	89(87.3)	73(88.0)	16(84.2)	
Yes	3(2.9)	2(2.4)	1(5.3)	

Obesity				0.5
No	86(84.3)	71(85.5)	15(78.9)	
Yes	16(15.7)	12(14.5)	4(21.1)	
Co-morbidities				
Diabetes (DM)				0.004* OR=1.5
No	62(60.8)	56(67.5)	6(31.6)	
Yes	40(39.2)	27(32.5)	13(68.4)	
Chronic artery disease (CAD)				0.04* OR=1.7
No	96(94.1)	80(96.4)	16(84.2)	
Yes	6(5.9)	3(3.6)	3(15.8)	
Hypertension (HTN)				0.6
No	65(63.7)	52(62.7)	13(68.4)	
Yes	37(36.3)	31(37.3)	6(31.6)	
Chronic kidney disease (CKD)				0.9
No	97(95.1)	79(95.2)	18(94.7)	
Yes	5(4.9)	4(4.8)	1(5.3)	
Heart failure (HF)				0.5
No	99(97.1)	81(97.6)	18(94.7)	
Yes	3(2.9)	2(2.4)	1(5.3)	
Asthma				0.6
No	101(99.0)	82(98.8)	19(100)	
Yes	1(1.0)	1(1.2)	0	
OLD TB				0.7
No	101(99.0)	83(100)	18(94.7)	
Yes	1(1.0)	0	1(5.3)	
HIV				0.8
No	101(99.0)	82(98.8)	19(100)	

Yes	1(1.0)	1(1.2)	0

** Significant at α<0.05, Odds ratios were estimated when statistically appropriate*

Symptoms

The average number of days from the date of symptom appearance to admission was 7.7(4.2) days. The most common presenting symptom was shortness of breath (SOB) (69.6%). The proportion of patients presented with SOB was significantly higher among those who required critical care compared to those who did not require critical care (89.5% vs 65.1% respectively, OR = 1.3, P = 0.03) (Table 2).

Differences in proportions between the severe and non-severe cases across other symptoms like sneezing (15.8% vs 4.8%), dry cough (78.9% vs 78.3%), sputum (31.6% vs 20.5%), chest pain (21.1% vs 25.3%), skin (only one patient), lethargy (31.6 vs 31.3%), dizziness (5.3% vs 7.2%), headache (21.1% vs 19.3%), fever (68.4% vs 78.3%), diarrhoea (26.3 vs 24.1%), loss of smell (8.4% from those who did not require critical care only), loss of taste (9.6% from those who did not require critical care only) and body aches (15.8% vs 20.5%) were not significant. Significantly (P = 0.03), more proportion of cases in the non-severe group (27.7%) had sore throat compared to those in the severe group (4.2%) (Table 2).

Given diagnosis

According to the national diagnostic criteria's [9], majority of the patients were diagnosed as pneumonia (92.2%). However, the proportion of patients with Acute Respiratory Distress Syndrome (ARDS) was significantly higher in those requiring vs not requiring critical care (63.2% vs 6.0% respectively, P<0.001) (Table 2).

Table 2: Symptoms and diagnosis of the confirmed COVID-19 cases admitted at Al-Nahdha hospital

N (%)	Total population (n=102)	Not requiring critical care (n=82)	Requiring critical care (n=19)	P value
Days of symptoms Mean(SD),[quartiles]	7.7(4.2), [5.0,7.0,10.0]	7.6(4.4), [4.8,7.0,10.0]	8.5(3.3), [6.0,7.0,10.5]	0.21
Presenting symptoms				
Sneezing				0.09
No	95(93.1)	79(92.2)	16(84.2)	
Yes	7(6.9)	4(4.8)	3(15.8)	
Dry cough				0.9
No	22(21.6)	18(21.7)	4(21.6)	
Yes	80(78.4)	65(78.3)	15(78.9)	
Sputum				0.2
No	79(77.5)	66(79.5)	13(68.4)	
Yes	23(22.5)	17(20.5)	6(31.6)	
Chest pain				0.7
No	77(75.5)	62(74.7)	15(78.9)	
Yes	25(24.5)	21(25.3)	4(21.1)	
Sore throat				**0.03** **OR=3.2**
No	78(76.5)	60(72.3)	18(94.7)	
Yes	24(23.5)	23(27.7)	1(5.3)	
Skin				0.6
No	101(99.0)	82(98.8)	19(100)	
Yes	1(1.0)	1(1.2)	0	
Lethargy				0.9
No	70(68.6)	57(68.7)	13(68.4)	
Yes	32(31.4)	26(31.3)	6(31.6)	
Dizziness				0.8
No	95(93.1)	77(92.8)	18(94.7)	
Yes	7(6.9)	6(7.2)	1(5.3)	

Headache				0.8
No	82(80.0)	67(80.7)	15(78.9)	
Yes	20(19.6)	16(19.3)	4(21.1)	
Fever				0.3
No	24(23.5)	18(21.7)	6(31.6)	
Yes	78(76.5)	65(78.3)	13(68.4)	
Shortness of breath				**0.03** **OR=1.3**
No	31(30.4)	29(34.9)	2(10.5)	
Yes	71(69.6)	54(65.1)	17(89.5)	
Diarrhoea				0.8
No	77(75.5)	63(75.9)	14(73.7)	
Yes	25(24.5)	20(24.1)	5(26.3)	
Loss of smell				0.2
No	95(93.1)	76(91.6)	19(100)	
Yes	7(6.9)	7(8.4)		
Loss of taste				0.2
No	94(92.2)	75(90.4)	19(100)	
Yes	8(7.8)	8(9.6)		
Body ache				0.8
No	82(80.4)	66(79.5)	16(84.2)	
Yes	20(19.6)	17(20.5)	3(15.8)	
Given diagnosis				
Pneumonia				
No	8(7.8)	8(9.6)	0	0.2
Yes	94(92.2)	75(90.4)	19(100)	
Acute respiratory distress syndrome				**<0.001**
No	85(83.3)	78(94.0)	7(36.8)	
Yes	17(16.7)	5(6.0)	12(63.2)	

Odds ratios were calculated when statistically appropriate

Laboratory reports

All patients from both groups, requiring and not requiring critical care, had high levels of C-reactive protein (CRP) (100% vs 92.8%), D-Dimer (57.9% vs57.8%) and LDH (94.7% vs 81.9%) respectively. However, these proportions were not significantly associated with the severity of the disease. On the other hand, serum ferritin levels were significantly higher in those requiring critical care (100% vs 80.7%, P = 0.03). Consistently, results from t- test for two independent samples showed that the difference in mean ferritin levels between the two groups was significant (P = 0.005).

Less than half of the patients had abnormal counts/levels from the CBC parameters [low WBCs (20.6%), low Neutrophils (42.2%), and low Lymphocytes (43.1%)]. Liver function test showed mixed results. More patients had normal levels of ALT (57.8%), AST (56.9%), ALP (83.3%), and bilirubin (90.2%). Notably, few patients had high creatinine levels (23.5%) and all blood cultures were negative (Table 3).

Radiology reports

Chest X-rays showed bilateral infiltrations in 73.5% of the patients (89.5% in patients requiring critical care vs 68.7% in those not requiring critical care). The difference in proportions in reported findings from the chest X-rays between the two groups were borderline significant (P = 0.05).

Table 3: Laboratory and radiological reports of confirmed COVID-19 Patents in Al-Nahdha hospital

N (%)	Total population (n=102)	Not requiring critical care (n=82)	Requiring critical care (n=19)	P value
Laboratory investigation*				
CPR **(0-5 mg/L)**	85.2(84.7), [22.8,53.0,115,0]	79.8(86.6), [18.0,45,0,112.0]	109.1(72.8), [42.0,82.0,151.0]	0.2
Abnormal	96(94.1)	77(92.8)	19(100)	0.2
Normal	6(5.9)	6(7.2)		
D Dimer **(0.1-0.5mg/L)**	3.2(15.1)[0.3,0.6,1.0]	2.8(15.1), [0.3,0.0.6,0.9]	4.7(15.2),[0.3,0.5,2.2]	0.6
Abnormal	59(57.8)	48(57.8)	11(57.9)	0.9
Normal	43(42.2)	35(42.2)	8(42.1)	
Troponin **(0-14ng/L)**	46.6(275.0), [6.0,7.0,13.0]	9.0(6.9),[5.0,6.0,10.0]	182.5(588.5), [9.5,12.0,29.50]	0.3
Abnormal	34(33.3)	28(33.7)	6(31.6)	0.8
Normal	68(66.7)	55(66.3)	13(68.4)	
LDH **Male(135-225 U/L)** **Female(135-214 U/L)**	309.1(108.7), [232.3,299.0,367.8]	289.5(92.5), [221.5,292.5,34.8.0]	392.3(134.3), [279.5,384.5,488.8]	0.06
Abnormal	86(84.3)	68(81.9)	18(94.7)	0.1
Normal	16(15.7)	15(18.1)	1(5.3)	
Ferritin **(30-400µg/L)**	21(2000), [492.5,814.0,1240.0]	795.7(554.3), [372.0,705.0,1098.5]	2350.4(423.8), [702.7,1288,1965.5]	0.005
Abnormal	86(84.3)	67(80.7)	19(100)	0.03*
Normal	16(15.7)	16(19.3)	0	
ALT **(4-40 U/L)**				0.6
Abnormal	43(42.2)	36(43.4)	7(36.8)	

Normal	59(57.8)	47(56.6)	12(63.2)	
AST **(10-42 U/L)**				0.5
Abnormal	44(43.1)	37(44.6)	7(36.8)	
Normal	58(56.9)	46(55.4)	12(63.2)	
ALP **(36-104 U/L)**				0.9
Abnormal	17(16.7)	14(16.9)	3(15.8)	
Normal	85(83.3)	69(83.1)	16(84.2)	
Billirubin **3-10 umol/L**				0.5
Abnormal	10(9.8)	9(10.8)	1(5.3)	
Normal	92(90.2)	74(89.2)	18(94.7)	
Creatinine **62-106 umol/L**				0.7
Abnormal	24(23.5)	20(24.1)	4(21.1)	
Normal	78(76.5)	63(75.9)	15(78.9)	
WBCs **2.4-9.6 10*9g/L**				0.6
Abnormal	21(20.6)	18(21.7)	3(15.8)	
Normal	81(79.4)	65(78.3)	16(84.2)	
Neutrophil **10*3/uL**				0.5
Abnormal	43(42.2)	36(43.4)	7(36.8)	
Normal	59(57.8)	47(56.6)	12(63.2)	
Lymphocyte **10*3/uL**				0.3
Abnormal	44(43.1)	34(41.0)	10(52.6)	
Normal	58(56.9)	49(59.0)	9(47.4)	
CXR				0.05

Normal	12(11.8)	12(14.5)	1(5.3)
Unilateral infiltrate	15(14.7)	14(16.9)	1(5.3)
Bilateral infiltrate	75(73.5)	57(68.7)	17(89.5)

Shaded areas signifies results from t-test of independent samples

Treatment measures

Oseltamivir was utilized by 94.1% of the patients (Table 4). Most patients were on multiple treatment plans according to the COVID−19 national management guidelines [9]. Hydroxychloroquine alone was given to 3.9% of patients. However, 88.2 % (n = 90) of patients received it in combination with azithromycin. In addition to the combination of Hydroxychloroquine and azithromycin, 37.3 % of patients received lopinavir/ritonavir (Kaletra), and 38.2 % of patients received interferon. All patients had multiple electrocardiograph (ECG) tests and a close monitoring of QT interval (QTc) according to the national guidelines on the use of hydroxychloroquine [9]. Only 3.9% of all ECGs showed prolonged QT interval for which hydroxychloroquine and or Kaletra were held.

The proportion of patients who received interferon were significantly higher among those requiring vs those not requiring critical care [89.5 % vs 26.5% (P<0.001)].

In regards to antibiotic use, patients were given ceftriaxone (79.4%), clarithromycin (26.5%), and Doxycycline (2.9%), Augmentin (15.7%) and Tazocin (36.3%). Augmentin was only utilized in patients who did not require critical care (19.3%). The proportion of patients who received Tazocin was significantly higher in those requiring critical care (63.2 vs 30.1%, P = 0.02) (Table 4).

Other treatments included use of heparin to majority of patients (77.5%). Moreover, steroids were given to 33.3% of patients which was significantly higher in those requiring vs not requiring critical care by about 5 times (63.2% v 26.5%, P = 0.002) (Table 4).

Table 4: treatment measures of confirmed COVID-19 cases admitted at Al-Nahdha hospital

Treatment				
Oseltamivir				0.2
No	6(5.9)	6(7.2)		
Yes	96(94.1)	77(92.8)	19(100)	
Hydroxychloroquine alone*				
No	98(96.1)	80(96.4)	18(94.7)	0.8
Yes	4(3.9)	3(3.6)	1(5.3)	
(Hydroxychloroquine + azithromycin)				0.7
No	12(11.8)	10(12.0)	2(10.5)	
Yes	90(88.2)	73(88.0)	17(89.5)	
Kaletra (lopinavir/ritonavir)				0.1
No	63(61.8)	61(73.5)	2(10.5)	
Yes	39(38.2)	22(26.5)	17(89.5)	
Interferon				**<0.001** **OR=3.5**
No	63(61.8)	61(73.5)	2(10.5)	
Yes	39(38.2)	22(26.5)	17(89.5)	
Antibiotics				
Ceftriaxone				0.5
No	21(20.6)	18(21.7)	3(15.8)	
Yes	81(79.4)	65(78.3)	16(84.2)	
Clarithromycin				0.08
No	75(73.5)	64(77.1)	11(57.9)	
Yes	27(26.5)	19(22.9)	8(42.1)	
Doxycycline				0.5
No	99(97.1)	81(97.6)	18(94.7)	
Yes	3(2.9)	2(2.4)	1(5.3)	
Augmentin				**0.04**

No	86(84.3)	67(80.7)	19(100)	
Yes	16(15.7)	16(19.3)	0	
Tazocin				**0.007** **OR=3.7**
No	65(63.7)	58(69.9)	7(36.8)	
Yes	37(36.3)	25(30.1)	12(63.2)	
Other treatment protocols				
LMWH				0.5
No	23(22.5)	20(24.1)	3(15.8)	
Yes	79(77.5)	63(75.9)	16(84.2)	
Steroids				**0.002** **OR=4.7**
No	68(66.7)	61(73.5)	7(36.8)	
Yes	34(33.3)	22(26.5)	12(63.2)	

*>96.1% of patients had QTC <490 to monitor the use of hydroxychloroquine, Odds ratios were estimated when statistically appropriate

Discussion

This is a descriptive study that looked at the socio-demographic and clinical characteristics of COVID−19 confirmed cases in Al-Nahdha hospital in Muscat, Oman. Data was confined to admissions from the 3rd of March to 9th of May 2020. Results showed an increase in the number of confirmed COVID−19 cases admissions in the hospital reflecting the increase in the total number of confirmed cases nationally. There were a total of 102 admissions in which 18.6% required critical care (the primary outcome) and thus were transferred to other hospitals with facilities for critical care. Out of the 19 severe cases, 47.4% (n = 9) died (8.8% of the total admissions) which is less than reported death rates in similar studies (66.3%) in the UK [10] and more than the reported rate (15%) in China [1, 11]. Reasons for these differences in death rates across studies could be attributed to differences in study population and hospital capacities.

Overall, patients were around 50 years of age, mostly males and non-nationals. None of these factors were significantly different between patients requiring vs not requiring critical care. Notably, the population of Oman is 4631060 in which 41% are non-nationals/expatriates (The national centre for statistics and information, 2020). Admissions were noted to surge among the expatriates, there was a growing acknowledgment that collaboration between public and the private partnership was compulsory to solidify Universal Health Coverage (UHC) defined as equity and social justice to accessing health care services [12, 13]. Hence, in Oman, medical services against COVID–19 are free to all expatriates living in Oman.

Most referrals to Al-Nahdha hospital came from primary care health centres which are accessible to the public. Risk factors such as history of travel from a COVID–19 epidemic areas outbreak country with, smoking, alcohol consumption, and obesity were all un-common. However, these results were reported subjectively indicating the possibility of a recall bias.

Similar to many studies, presence of diabetes and CAD in patients in the current study were significantly associated with requiring critical care [14, 15]. A meta-analysis study from China (n = 1527 patients) reported that the most common cardiovascular-metabolic comorbidities associated with COVID–19 were hypertension, cardio-cerebrovascular disease, and diabetes (17.1%, 16.4%, and.7% respectively) [16]. In this report, patients with diabetes had 1.5-fold increase in risk of requiring critical care admission, while those with coronary arterial disease1.7-fold increase. In a sub-set of 355 patients with COVID–19 in Italy who died, the mean number of pre-existing underlying conditions was 2.7, and only 3 subjects did not have any comorbidity [17].

Oman, similar to neighbouring countries (Saudi Arabia, United Arab Emirates, Qatar and Bahrain), has high rates of diabetes exceeding the global estimates [18]. Diabetes is consistently reported to be one of the leading causes of morbidity and mortality throughout the world [18]. This disease, especially in older populations, is associated with infections, particularly influenza and pneumonia [19]. However, more evidence may be required to explore the factors associated with increase susceptibility to infections in individuals with diabetes and with other cardiovascular and renal comorbidities [14, 20]. These finding suggest that patients with diabetes and CAD should be protected from COVID–19 and managed promptly in case of positivity.

Unlike others studies, asthma and other comorbidities in the current study were not significantly associated with requiring critical care [14, 15]. Future studies may consider larger sample size to unfold any associations.

Notably, out of the commonly reported symptoms of fever, cough, fatigue, and sputum production, this study showed that shortness of breath was the only symptom significantly associated with requiring critical care was. The absence of fever in Covid–19 (23.5%) is more frequent than in SARS-CoV and MERS-CoV infection((1%, and 2% respectively) [21], hence individuals who are afebrile may be missed if the surveillance case definition is centred around fever detection [22]. Headache, Upper respiratory symptoms (e.g., sore throat and rhinorrhea) and gastrointestinal symptoms (e.g., nausea and diarrhoea) occurred less often as reported elsewhere [11]. Although not described in the literature from China, smell and taste disorders (anosmia and dysgeusia) were reported by patients from the current study confirming the reports from patients with COVID–19 in Italy [17].

In laboratory examination results from several studies, most patients had abnormal or decreased white blood cell counts, particularly lymphocytopenia [2]. In the current study less than half of our patients had lymphopenia (43.1%). D-dimer, levels were raised in more than half of the patients. This finding was reported to be high in COVID–19 cases [23]. Serum ferritin was the only significantly higher in patients requiring critical care. This is consistent with the findings from a recent study confirm high levels of ferritin in severe cases of COVID–19 [24]. Similarly, the phenomena of hyperferritinemia was documented as being common in severe cases with septic shock, and other medical conditions characterized by macrophage response activation [25]. Thus, high ferritin can be considered as a marker for monitoring the severity of COVID–19 cases.

Abnormalities from Chest X-ray were detected in majority of the patients being significantly higher in those requiring critical care. This finding confirms the evidence reported in several papers [11]. Additionally, similar to the existing reports, most patients presented with pneumonia and ARDS [11]. In the current study there was 6% of cases diagnosed with ARDs who did not require critical care. This finding could be explained by the early management with supportive care and prone manoeuvres that had prevented deterioration and thus the need for critical care [26].

Up to date, except for meticulous supportive care, there is no specific treatment for coronavirus infection [27]. The approach to this disease is to contain the spread of the virus (use of personal protective equipment; and precaution to reduce the risk of transmission), early diagnosis, isolation, and supportive treatments for the positive cases [6].

Effectiveness of hydroxychloroquine, antibacterial and antiviral agents are inconclusive [2, 28]. Despite lack of robust evidence on the use of hydroxychloroquine in COVID–19, most of cases in the current study received it and had favourable outcomes. Future well design trials are warranted to evaluate the possibility of hydroxychloroquine in accelerating recovery of hospitalised COVID–19 cases.

Most of the patients in this study received antibacterial agents, more than third received antiviral therapy, 77.5% received heparin and 33.3% received steroids depending on disease severity. Administrating corticosteroid in severe cases of COVID–19 has been supported in several recent studies from china [29] and the United Kingdom [30]. This approach is hoped to enhance recovery and reduce mortalities.

This study has some limitations. First, the subjective nature of some variables (dates of onset of symptoms, history of smoking, obesity and other reported risk factors) may have introduced a recall bias. Second, this study cohort may represent the more severe end of COVID–19 as asymptomatic cases or those with mild symptoms (treated at home) were missed in this study. Third, many patients did not undergo sputum bacteriologic or fungal assessment on admission because medical resources were overwhelmed. Fourth, missing data on the socio economic status of the cases which would've highlighted the non-clinical provisional factors associated with severity of the disease.

Despite these limitations, this study provides evidence on some socio-demographic and clinical characteristics of confirmed cases of COVID–19 in an Arabic speaking country where information is sparse in the current literature. More work is needed specifically from the Arab world to compare and contrast experiences on COVID–19 with the rest of the world.

Conclusions

Less than 20% of patients with COVID–19 in Al-Nahdha hospital required critical care. Many were older males and non-nationals. Public health measures are required to contain the virus transmission among the non-nationals and ensure universal health coverage. Diabetes and coronary artery disease were significant predictors for the requirement of critical care. Despite some diversity in initial symptoms, most COVID–19 patients had respiratory symptoms. Depending on disease severity, treatment included anti-bacterial, anti-viral, heparin and steroids. Despite the descriptive nature of this study, the information obtained can be utilized in the Arabic speaking countries where such reports are limited.

List Of Abbreviations

Alkaline phosphatase (ALP)

Alanine aminotransferase (ALT)

Aspartate aminotransferase (AST)

Chest x-ray (CXR)

Chronic Kidney Disease (CKD)

Complete blood count (CBC)

Coronavirus disease 19 (COVID–19)

Corrected QT interval (QTc)

C-reactive protein (CRP)

Electrocardiogram (ECG)

Erythrocyte sedimentation rate (ESR)

Heart failure (HF)

Lactate dehydrogenase (LDH)

Primary health care centres (PHC)

Sultan Qaboos University Hospital (SQUH).

World Health Organization (WHO)

Declarations

Ethics approval and consent to participate:

Ethical approval was obtained from the Regional Research Committee in Ministry of Health based on secondary data collection.

Consent for publication:

Not applicable

Availability of data and material:

Data generated from this study is not available for public use. However it is available from the corresponding author on reasonable request and approvals from Oman Ministry of Health.

Competing interests:

The authors declare that they have no competing interests

Funding:

The research council (TRC), Oman.

Authors' contributions:

SA supervised the analysis of this data, interpreted the data and wrote the manuscript; MO and TA interpreted the data and reviewed the manuscript. All other authors reviewed the study proposal, assessment tools, interpretation of data and the manuscript. All authors read and approved the final manuscript.

Acknowledgments

Many thanks to: our staff nurses, ER colleagues, lab staff and pharmacy and everyone involved in the management of COVID-19 patients, for their excellent support. Special thanks to the TRC for funding this project and constant support.

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Figures

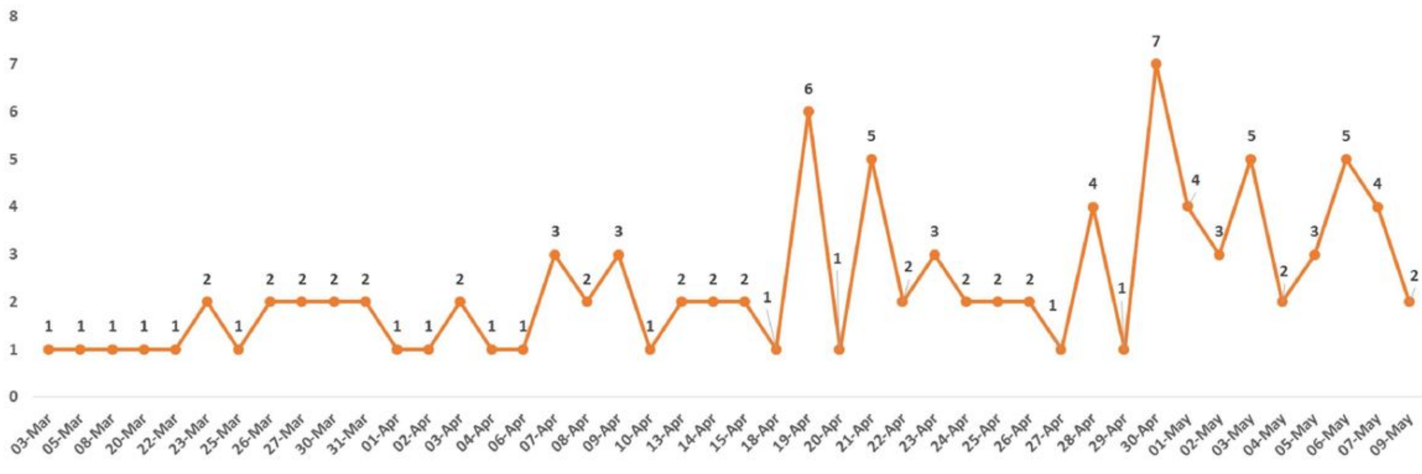

Figure 1

Trend in the number of confirmed COVID-19 cases admitted in Al-Nahdha hospital from the 3rd of March to 9th of May 2020

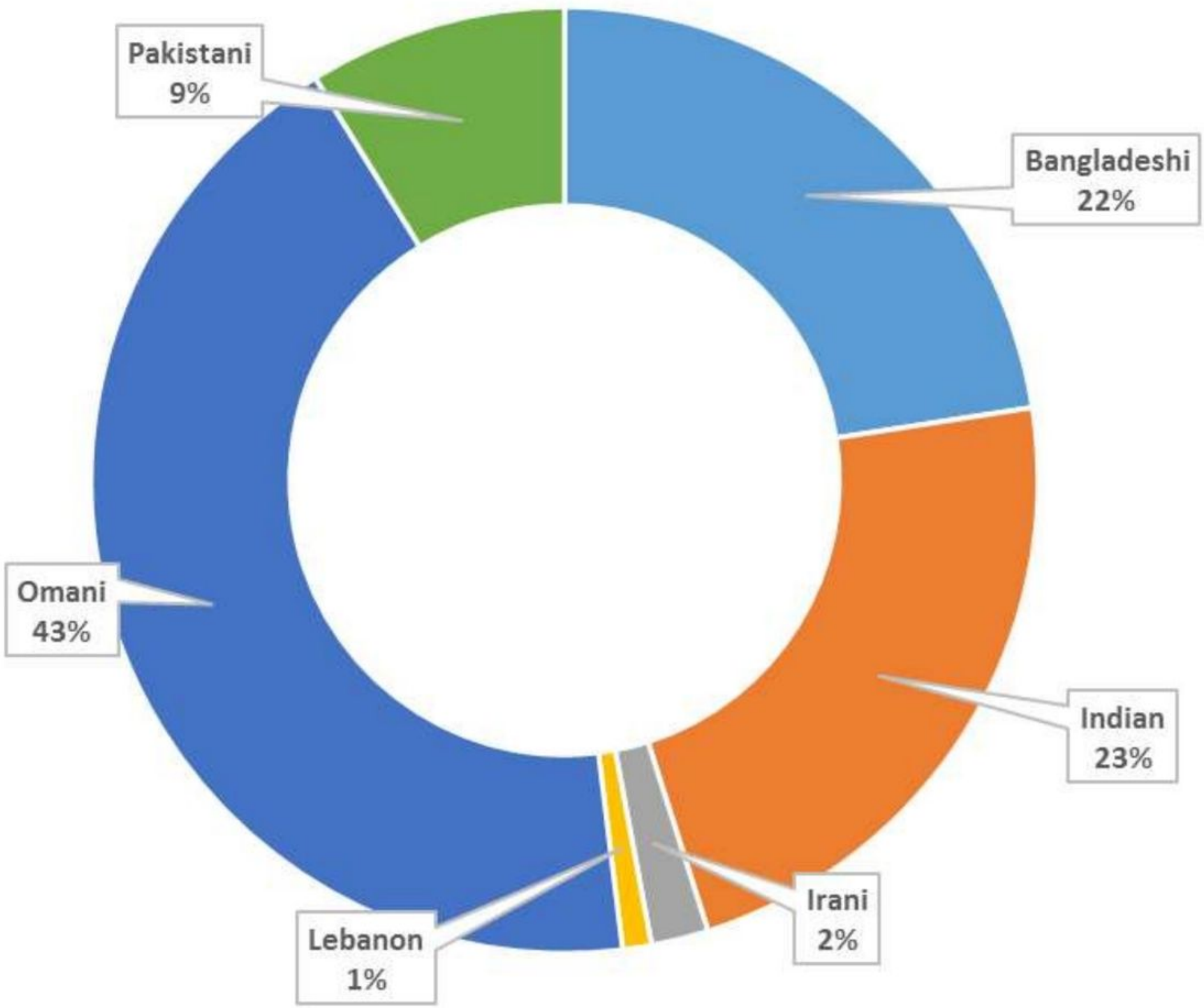

Figure 2

The nationalities of the of confirmed COVID-19 cases admitted in Al-Nahdha hospital from the 3rd of March to 9th of May 2020

Supplementary Files

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