

## Editorial

# Clinical and Epidemiological Characteristics of COVID-19 in a Multi-National Cohort in the Middle East

The Kingdom of Bahrain, a country of around 1.5 million [1], reports as of February 2021, over 100,000 cases, and 420 deaths [2], ranking it as the 14th-highest country in terms of cases per 100,000, but the 90th highest in deaths per 100,000 [3]. In terms of public health measures, Bahrain's Oxford COVID-19 Government Response Tracker (OxCGRT) Stringency level score peaked at 78.7 in late March/April. Enforced measures included school closure, cancellation of public events, use of face masks in public, international travel restrictions, comprehensive contact tracing, and a coordinated public campaign [4].

We conducted retrospective clinical and population-based analysis of COVID-19 cases reported from February 24, 2020—when the first case was diagnosed—to November 10, 2020. All cases were diagnosed as COVID-19 based on reverse transcriptase-polymerase chain reaction (RT-PCR) tests of nasopharyngeal samples. We report findings from one of the largest cohorts globally and the largest in the region to date. We hope this will diversify and address important gaps in the current literature, and guide and focus clinical and public health measures in the region.

The total number of positive cases identified was 83,811 (Table 1). The total number of tests conducted in the same time period was 1.84 million tests (4.5% of which were positive). Mean age of the individuals was 32.76 years ( $\pm 16.37$ ), with a male majority (66.37%). Ninety-nine nationalities are reported in the cohort, with Bahrainis representing the majority (54.96%). In terms of WHO Regions, the Eastern Mediterranean Region forms 63.67% of cases, followed by South-East Asia Region (33.36%), Western Pacific Region (1.34%), African Region (1.10%), Region of the Americas (0.28%), and European Region (0.24%). Only 32.83% of the cohort was symptomatic. Children were more likely to present asymptotically (70.5% vs 66.3%). 54.5% ( $n = 45,891$ ) were admitted to hospital and isolation facilities. 0.7% ( $n = 623$ ) required ICU admission. The overarching death rate is at 0.39% ( $n = 331$ ), with 97.1% of cases recovered/discharged.

In the subset analysis, we identified a total of 1792 patients hospitalized in COVID-19 hospitals. The mean age was 46.2 ( $\pm 16.7$ ), with a male majority (59.0%). The majority (63.3%) of the admitted patients presented with symptoms. Most common symptom was cough (42%), followed by fever (22.4%), dyspnea (20.1%), myalgia (15.5%), and chest pain (8.9%). Other less commonly reported symptoms included diarrhea (5.8%), nausea/vomiting (5.2%), anosmia (3.1%), and ageusia (3.0%). The most common comorbidities

**Table 1** | Characteristics of COVID-19 cases and admitted patients in Bahrain, from February 24th to November 10th, 2020

Characteristics	Values
All COVID-19 cases ( $n = 83,811$ )	
Age	
Mean – years	32.76
Distribution – %	
0–9	10.50
10–19	9.81
20–29	19.71
30–39	27.79
40–49	17.11
50–59	9.69
60–69	3.83
70–79	1.12
80–89	0.39
90–99	0.06
100+	0.001
Male sex – %	66.37
Nationality – %	
Eastern Mediterranean Region	63.67
South-East Asia Region	33.36
Western Pacific Region	1.34
African Region	1.10
Region of the Americas	0.28
European Region	0.24
Symptomatic – %	32.83
Outcomes – % ( $n$ )	
Discharged	97.14 (81,418)
Admitted to hospital/Isolation facility	54.5 (45,891)
Active	2.46 (2062)
Admitted to ICU	0.7 (623)
Death	0.39 (331)
Clinically admitted COVID-19 patients ( $n = 1792$ )	
Mean age – years	45.93
Male sex – %	59.0
Bahraini Nationality – %	56.6
Smoking history – %	
Never smoked	96.66
Former smoker	1.32
Current smoker	2.02
Symptoms – %	
Symptomatic	63.3
Cough	42.0

(Continued)

**Table 1** Characteristics of COVID-19 cases and admitted patients in Bahrain, from February 24th to November 10th, 2020—Continued

Characteristics	Values
Fever	22.4
Dyspnea	20.1
Myalgia	15.5
Chest-pain	8.9
Diarrhea	5.8
Nausea/Vomiting	5.2
Anosmia	3.1
Ageusia	3.0
Comorbidities – %	
Hypertension	29.7
Diabetes mellitus	28.9
Cardiovascular disease	10.04
Glucose-6-phosphate dehydrogenase deficiency	9.8
Asthma	4.5
Chronic kidney disease	4.4
Obesity	3.24
Sickle cell disease	2.1
Other lung diseases	0.5
Chronic obstructive pulmonary disease	0.4
Disease severity on admission – % (n)	
Admitted on room air	88.11 (1578)
Admitted and on oxygen support	11.28 (202)
Admitted and on NIV/HFNC	0.45 (8)
Invasive ventilation	0.17 (3)
Outcomes	
Mean length of stay – days (IQR)	10.56 (6–13)
Length of stay (survivors) – days (IQR)	10.4 (6–13)
Length of stay (non-survivors) – days (IQR)	14.4 (5–19)
Ventilated (non-invasive and invasive) – %	8.31
Intubated – %	2.62
Extubated – %	36.17
Died – %	3.29

NIV, non-invasive ventilation; HFNC, high-flow nasal cannula.

included hypertension (29.7%), diabetes mellitus (28.9%), cardiovascular disease (10.04%), glucose-6-phosphate dehydrogenase (G6PD) deficiency (9.8%), asthma (4.5%), chronic kidney disease (CKD) (4.4%), obesity (3.24%), sickle cell disease (2.1%), and chronic obstructive pulmonary disease (COPD) (0.4%). 2.2% identified as current smokers, and 1.32% as ex-smokers.

11.2% ( $n = 202$ ) of patients required supplemental oxygen on admission, 0.45% ( $n = 8$ ) required non-invasive ventilation/high-flow nasal cannula, and 0.17% ( $n = 3$ ) required invasive ventilation. During hospital stay, we ventilated 8.31% of patients, and intubated 2.62%. The overall mean length of stay was 10.56 days [Interquartile Range (IQR); 6–13]. For survivors, the mean length of stay was 10.4 (IQR; 6–13), compared to 14.4 (5–19) for non-survivors. The overall death rate was 3.29%.

Logistic regression identified symptomatic status ( $p < 0.05$ ), CKD, and hypertension ( $p < 0.01$ ), as statistically significant predictors of severe respiratory disease (defined by ventilatory requirement).

Our study would be one of the largest cohorts from this region to confirm the association between certain comorbidities and disease severity, but that does not identify age as a risk factor [5]. Our cohort is one of the youngest reported in the literature [6,7]. We also report one of the highest proportions of asymptomatic cases [8],

which may be related to the intensive wide screening policies. In terms of disease presentation, our cohort corroborates global findings, ranking cough, fever, and dyspnea as most common, albeit at a lower prevalence [6]. With regards to prevalence of comorbidities, and in line with reports from Iran and Kuwait, diabetes is a significantly prevalent comorbidity, unlike Western and East Asian cohorts [6,7,9]. Additionally, we report a higher prevalence of G6PD, and sickle cell disease compared to other cohorts, which is in line with this region's disease epidemiology [10].

## CONFLICTS OF INTEREST

The authors declare they have no conflicts of interest.

## AUTHORS' CONTRIBUTION

SIM drafted the manuscript. AA and AIA collected the data. SIM, AA and AIA analysed and interpreted the data. AA and MMA edited the manuscript. MMA supervised the project from conception and critically reviewed the manuscript. All authors contributed significantly to and approve of the final manuscript.

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## ETHICAL APPROVAL

The data collected for the study was approved by the National COVID-19 Research and Ethics Committee.

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