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Burden of COVID-19 on Health System in Iraq, 2020

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Abstract

Introduction: As the COVID-19 pandemic expands, information on the distribution of the burden of disease is required to plan an effective allocation of the available medical resources.

Aim: The current study is aiming for displaying burden of COVID-19 on health system in Iraqi Governorates during the year 2020.

Method and subjects: A prospective cohort study design was adopted. The required data were obtained from the daily report of COVID-19 in Iraq that is published officially by the Iraqi Ministry of Health and Environment from February 24 to December 31st, 2020.

Burden of COVID-19 was described by estimating the percentage of positive results among all performed PCR tests; incidence, mortality and case fatality rates in each Iraqi Governorate and rate of hospitalization of confirmed cases.

Results: By the end of 2020, almost tenth of the performed PCR tests were positive for COVID-19 (10.9%). Incidence of COVID-19 in Iraq was 15.0 per 1000 with a range from 28.2-4.3 %. Case fatality rate among COVID-19 cases in Iraq was 2.2% and fluctuated between 5.8% and 0.9%.

Mortality rate of COVID-19 in Iraq was 33.3 per 100000 people ranging between 88.2 and 3.9 per 100000. The highest monthly average number of COVID-19 cases that were being admitted to hospital was in October, November and September. Almost one among a hundred cases required admission to intensive care unit during August and September.

Recommendations: Effective resource-allocation of material and man power is recommended in order to diminish burden of COVID-19 pandemic in the future.

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Introduction

The infectious disease, COVID-19, has been declared by the World Health Organization (WHO) as the latest pandemic on March 11, 2020 [1]. Only three months later, pandemic of COVID-19 has extended to our country, Iraq [2]. First case was reported in Al-Najaf Governorates, about 160 km (100 mi) south of Baghdad as it was officially announced by Iraqi Ministry of Health and Environment [3]. Although the preventive measurements that were rapid predicated by the Iraqi Authorities including nationwide curfew, health education for encouraging healthy life style and imposing social distance [4], COVID-19 extended to the whole nation [5].

The available evidence suggests that COVID-19 has a zoonotic source but it continues infecting human since its outbreak in Wuhan, China, in December 2019 [6]. The causative agent is the novel coronavirus, SARS-CoV-2 which shows rapid transmission through human-to-human chain [7] (about 6 feet or two arm lengths direct close contact) or by respiratory droplets [1].

People with COVID-19 express a wide range of symptoms from mild respiratory symptoms to severe fatal illness, 2-14 days after getting the infecting virus [1]. Atypical symptoms were reported among older people or immunosuppressed people [8]. In addition, being male, aged more than 60 years old, with underlying non-communicable comorbidities and smoking all are increasing the risk of death from COVID-19 [9].

As the COVID-19 pandemic expands, all efforts of health system are needed for limiting fatalities. Effective allocation of the accessible medical resources, such as healthcare workers, protective equipment and ventilators, is mandatory to reduce the likelihood of the healthcare system being overwhelmed. Otherwise, the standard of care for all individuals seeking medical care could be reduced, thereby exacerbating negative health outcomes and patients critically ill with COVID-19 might fare particularly poorly. So that, information on the distribution of the burden of disease is required to plan the desired allocation [10].

The current study is aiming for displaying burden of COVID-19 on health system in Iraqi Governorates during the year 2020.

Method and subjects

A prospective cohort study design was adopted in order to achieve the desired aim. The required data were obtained from the daily report of COVID-19 in Iraq that is published officially by the Public Health Department in Iraqi Ministry of Health and Environment [2]. It gives information about many aspects of COVID-19, as the following:

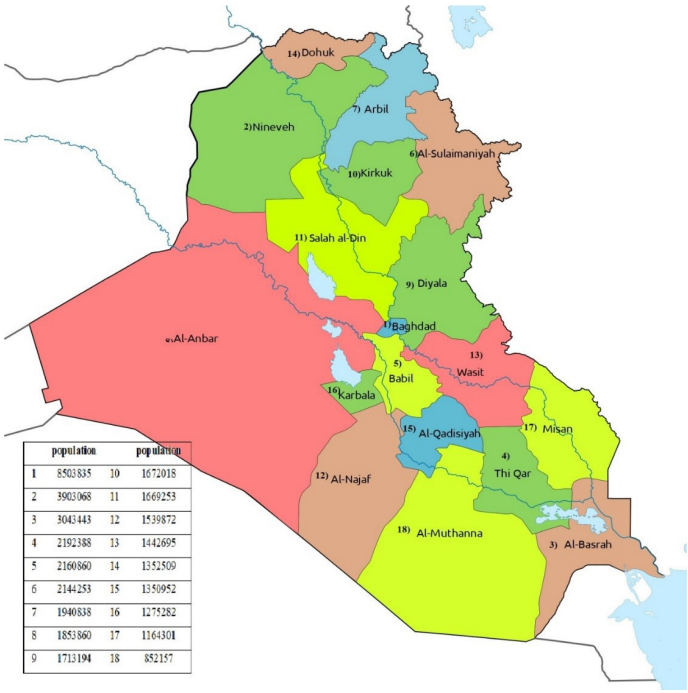
A. Laboratory investigation: The report display number of performed polymerase chain reaction (PCR) test of the upper respiratory tract (upper nasal and/or oropharyngeal) swabs in Iraq in general. It is an authorized viral testing that detect SARS-CoV-2 nucleic acid or antigen.

B. Epidemiological data: The Ministerial health report shows number of confirmed cases that are being diagnosed, cured or died daily in each Iraqi Governorates. In addition, the crude number of accumulative cases, deaths and cure are stated.

C. Administrative aspect: The report also reveals the actual number of COVID-19 cases whose clinical symptoms were sever to the degree that required hospitalization and/or admission to Intensive Care Unit (ICU). The daily ministerial report started to display the number of hospitalized COVID-19 cases since Mat 5th 2020.

The required data were collected from February 24, 2020, the time when first case of COVID-19 had been confirmed in Iraq, to December 31st 2020.

The current study estimated incidence of COVID-19 according to its definition, number of NEW cases during a given period among population at risk during that period [11]. Included cases were infected patients with COVID-19 whose PCR test was positive. Cases with negative PCR were excluded from the equation of incidence calculation even if they were diagnosed on clinical or radiological base. Denominator of the equation was Population of Iraq in general and of each governorates in particular during the year 2020. It was derived from statistics of 2018 census and latest official estimates and projections that were published by the Report of Central Statistical Organization in Iraqi Ministry of Planning [12] (Figure 1).



	population		population
1	8503835	10	1672018
2	3903068	11	1669253
3	3043443	12	1539872
4	2192388	13	1442695
5	2160860	14	1352509
6	2144253	15	1350952
7	1940838	16	1275282
8	1853860	17	1164301
9	1713194	18	852157

Figure 1: Map of Iraqi Governorates by population, 2020.

Burden of COVID-19, the core of the current study, was described by estimating the following indicators:

1. Percentage of positive results among all performed PCR tests.

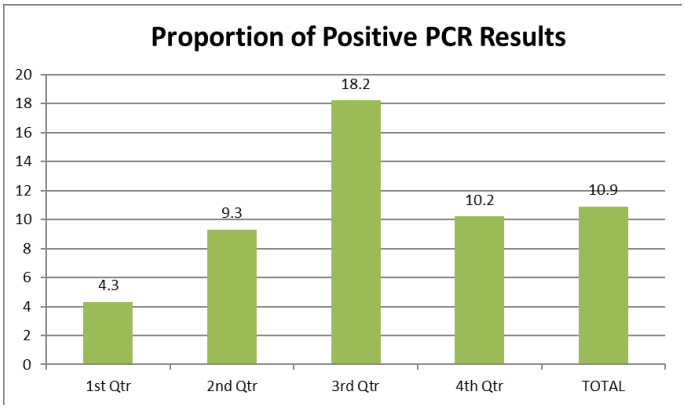
2. Incidence of COVID-19 in each Iraqi Governorate.

3. Mortality Rate (MR) and Case Fatality Rate (CFR) of COVID-19 according to their definition. Deaths of laboratory confirmed COVID-19 cases (testing positive PCR) of infected group were being counted as COVID-19 Deaths in the current study.

4. The average number of COVID-19 cases whose management necessitated hospital admission.

Results

The current study has found that at the end of the year 2020, almost tenth of the performed PCR tests were positive for COVID-19 (10.9%). The highest detection of the SARS-CoV-2 virus by PCR test was during the 3rd quarter of the year (July, August and September) (p= 0.000) (Figure 2).



*Chi² Test

Figure 2: Proportion of Positive PCR Results During The Years 2020, Iraq.

Incidence of COVID-19 in Iraq, according to the current study, was 15.0 per 1000; and it is almost double in Al_Muthanna and Duhok Governorates (28.2%, P=0.000 and 24.9%, P=0.000 in order). The incidence in Baghdad, the Capital, was 21.2% (p= 0.000). Nineveh and Al-Anbar reported the lowest incidence (6.1%, p=0.000 and 4.3%, p=0.000 respectively) Table 1.

Table 1: Incidence of COVID-19 in Iraq during the year 2020 by Governorates.

Iraqi Governorates	No. of new cases	Incidence	P-value	RR (95% CI)
Baghdad	180424	21.2	0.000	1.43 (1.42-1.44)
Ninavah	23989	6.1	0.000	0.41 (0.40-0.41)
Al-Basrah	39201	12.9	00.000	0.86 (0.85-0.87)
Dhi Qar	23653	10.8	0.000	0.71 (0.70-0.72)
Babil	20501	9.5	0.000	0.62 (0.61-0.63)
Al-Sulaymaniyah	32881	15.3	0.000	1.02 (1.01-1.03)
Arbil	36308	18.7	0.000	1.25 (1.24-1.26)
Al-Anbar	7895	4.3	0.000	0.28 (0.27-0.28)
Diyala	21443	12.5	0.000	0.83 (0.82-0.84)
Kirkuk	31951	19.1	0.000	1.28 (1.26-1.29)
Salah ad-Din	15230	9.1	0.000	0.60 (0.59-0.61)
Al-Najaf	21815	14.2	0.000	0.94 (0.93-0.96)
Wasit	32043	22.2	0.000	1.49 (1.48-1.51)
Duhok	33642	24.9	0.000	1.68 (1.66-1.69)
Al Diwaniyah	18285	13.5	0.000	0.9 (0.8-0.9)
Karbala	22232	17.4	0.000	1.16 (1.15-1.18)
Maysan	18106	15.6	0.000	1.04 (1.02-1.05)
Al_Muthanna	23989	28.2	0.000	1.91 (1.88-1.93)
IRAQ	596488	15.0		

Table 2 shows that CFR among COVID-19 cases was 2.2% all over the nation, Iraq. However, almost half of Iraqi Governorates have reported a higher rate. The rate ranged from 5.8% in Al-Sulaymaniyah Governorate, at the northern east of Iraq (p= 0.000) to 0.9% in Al-Anbar and Al_Muthanna Governorates (p= 0.000, and p=0.000 in order) at the west and south areas of Iraq respectively.

The table also displays that MR of COVID-19 among Iraqi population was 33.3 per 100000 people. It ranged from 88.2 per 100000 in Al-Sulaymaniyah Governorate to 3.9 per 100000 people in Al-Anbar Governorate. Baghdad Governorate reported the same MR as that of Iraq (33.3 per 100000 people) but its rank was the tenth in the list of highest MR.

Table 2: Mortality rate and Case fatality rate of COVID-19 in Iraq during the year 2020 by Governorates.

Iraqi Governorates	No. of deaths among cases	CFR%	P-value	RR (95% CI)	MR per 100,000
Baghdad	2831	1.6	0.000	0.73 (0.69-0.76)	33.3
Ninavah	481	2.0	0.000	1.96 (1.79-2.15)	12.3
Al-Basrah	904	2.3	0.04	1.08 (1.08-1.15)	29.7
Dhi Qar	812	3.4	0.000	1.62 (1.50-1.74)	37.0
Babil	745	3.6	0.000	1.71 (1.59-1.85)	34.5
Al-Sulaymaniyah	1894	5.8	0.000	0.48 (0.46-0.51)	88.2
Arbil	904	2.5	0.000	1.16 (1.09-1.25)	46.6
Al-Anbar	73	0.9	0.000	0.43 (0.34-0.54)	3.9
Diyala	268	1.3	0.000	0.58 (0.51-0.65)	15.6
Kirkuk	772	2.4	0.002	1.13 (1.05-1.21)	46.2
Salah ad-Din	259	1.7	0.000	0.79 (0.69-0.89)	15.5
Al-Najaf	306	1.4	0.000	0.65 (0.58-0.73)	19.9
Wasit	523	1.6	0.000	0.76 (0.69-0.83)	36.3
Duhok	684	2.0	0.16	0.95 (0.88-1.02)	50.6
Al Diwaniyah	397	2.2	0.000	0.83 (0.75-0.92)	29.4
Karbala	519	2.3	0.63	1.09 (0.99-1.19)	40.7
Maysan	449	2.5	0.002	1.16 (1.05-1.27)	38.6
Al_Muthanna	222	0.9	0.000	0.43 (0.37-0.49)	26.1
Iraq	12813	2.1		33.3	

Figure 3 displays the monthly average number of COVID-19 cases whose management necessitated hospital admission during the year 2020. It is noticed that the highest number of hospital admission was in October, November and September. Intensive care unit received the largest number of COVID-19 patients during August and September (566 and 526 cases in order) when almost one among a hundred cases (1.3% and 0.9% respectively) needed health services of ICU.

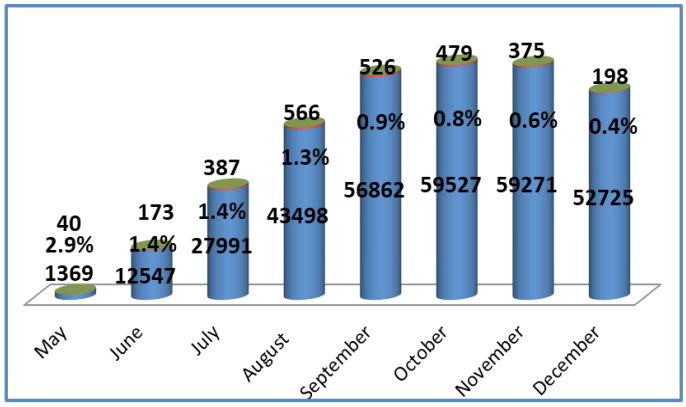


Figure 3: Number of hospitalized COVID-19 cases in Iraq during the year 2020 by month.

Discussion

The COVID-19 is an unprecedented infection which is caused by the novel corona virus that is named SARS-CoV-2. Its pandemic has extended to Iraq only three months after its first appearance in Yohan, China in December 2019 [13]. The condition represented a challenge on health system since it is not listed within the planning of the Iraqi Ministry of Health and Environment.

In spite that, diagnosis of COVID-19 still represents a dilemma. According to Johns Hopkins researchers in June 10, 2020 [14], PCR test is likely to test falsely negative for SARS-CoV-2 over the first four days of getting COVID-19 infection. The probability of a false-negative result in an infected person decreases from 100% to 67% on day 1 to day 4 respectively. On the day of symptom onset, typical day 5, the median false-negative rate was 38%; to 20% on day 8 (3 days after symptom onset). Then it began to increase again, from 21% to 66% on day 9 to day 21 correspondingly. So, they recommended to take care in interpreting PCR tests for SARS-CoV-2 infection particularly in the early course of infection; and do not rule out clinical presentation [15]. This may be the cause beyond the fact that less than fifth of the of the performed PCR tests (18.2%), at its maximum highest level, were positive for COVID-19 throughout 2020; the average proportion was (10.9%). Besides, one cannot exclude technical and transporting faults. All the above factors magnified the burden of COVID-19 on the local health system.

On the other hand, the maximum proportion of positive PCR tests during the third quarter of the year may be associated not only with improvement of technical skills of health workers; but also with real increment in the number of new infected cases. As the current study revealed that incidence of COVID-19 in Iraq has been raised from 313 per 100,000 people (3.1 per 1000 people) at the end of July, 2020 [13] to 15 per 1000 people at the end of the same year. The same time period, the third quarter of the year (July, August and September, 2020) has witnessed the greatest admission to ICU among hospitalized COVID-19 patients.

At the end of the year 2020, Iraq is on the top the list of "number of reported confirmed cases" among the Arabic country; and was the 25th in the whole world as indicated by the published statistics of the World Health Organization (WHO) [16]. However, incidence as well as actual impact of COVID-19 cannot be assessed nor be compared because the official statistics are concerning only with crude number of confirmed cases that are formally reported; without mentioning exposed population. Moreover, only cases whose PCR test were positive are being counted in official daily report of Iraqi Ministry of Health and eventually WHO statistics. While cases with negative PCR were excluded; even if they presented with clinical and/or radiological findings.

At the national level, the highest incidence of COVID-19 at the end of 2020 was reported in Al_Muthanna Governorate (28.2%, P=0.000) who had the lowest population in Iraq, Duhok Governorate (24.9%, p=0.000) and the Capital, Baghdad, (21.2%, P= 0.000) at the south, north and middle of Iraq respectively. While incidence of COVID-19 in Nineveh, the second most populous Iraqi Governorate after Baghdad, was 6.1 (P-0.000) during the same period of time.

In spite of all efforts that were made by the Iraqi Ministry of Health, mortality rate and CFR were still high in some regions so that exacerbating burden of COVID-19 on the local health system.

Al-Sulaymaniyah Governorate, a mountainous governorate in the Kurdistan Region of Iraq at about 355 Km northern east of Baghdad [17] reported almost triple the general level in Iraq (88.2 per 100,000 people and 5.8%, 33.3 per 100,000 and 2.1% respectively). So did Arbil (46.6 per 100,000 people and 2.5%) and Kirkuk (46.2 per 100,000 people and 2.4%).

Conclusion

Pandemic of COVID-19 creates a considerable burden on the local health system as indicated by the estimated increasing rates of incidence, mortality, case fatality and hospitalization.

Recommendation

Effective resource-allocation of material and man power is recommended in order to diminish burden of COVID-19 pandemic in the future.

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