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Omar K. Banoosh <sup>(1)</sup>  
Ammar A. Hamad <sup>(2)</sup>  
Layla A. Hameed <sup>(3)</sup>

(1) Salahaldin Health  
Directorate.  
Iraq

(2) Salahaldin Health  
Directorate  
Iraq

(3) Salahaldin Health  
Directorate.  
Iraq

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## Assessment of the Epidemiological and Clinical Factors Affecting Case Fatality Rate of Covid-19 in Samarra General Hospital

### ABSTRACT

**Background:** Case fatality rate is the most important measure of fatal disease severity, in which the proportion of number of people died from certain disease compared to the total number of people diagnosed with this disease for certain period of time. According to many reports reaching Public Health Department in Salahiddin Health Directorate, there was an increase in number of deaths of covid-19 cases in Samarra General Hospital, for that reason the current study conducted to estimate the case fatality rate of covid-19 in Samarra Hospital and to assess the epidemiological and clinical factors affecting it.

**Patients and Methods:** A cross-sectional descriptive study was done for all deaths happened in Samarra General Hospital due to covid-19 for the period from 23/6/2020 (the first death of covid-19 in Samarra), to 12/9/2020, and the total number studied was 81 deaths. From those only 57 deaths happened inside the hospital.

The data related to epidemiological and clinical factors of those 57 deaths were collected and analyzed statistically using Microsoft Excel 2013.

### Results:

The study showed that case fatality rate of covid-19 in Samarra city was (6.6%) which is more than that of Iraq. Deaths among male was more than female, and the larger number of deaths occur in age groups younger than that worldwide.

**Conclusion:** The case fatality rate of covid-19 in Samarra city is higher than normal in comparison with other cities. In Salahiddin, there is a need to assess the management guidelines used in Samarra General Hospital.

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\*Corresponding author E mail : [alalayoubi@gmail.com](mailto:alalayoubi@gmail.com)

### **Introduction:**

Throughout 2020, the world faced hazards of Covid-19 pandemic which caused global implication of safety public health steps including avoiding of crowded meetings, closing of schools and colleges, and even complete lockdown. In spite of these preventing measures, the total number of deaths in many countries was unprecedented since the last influenza pandemic in the twenties of the past century.

It is mandatory for health plan makers to be informed about the updated statistics of Covid-19 in each country and city, to be aware about the weak points that may need urgent interventions in order to avoid the rapid deterioration in the health situation of the community.

For that reason, Case Fatality Rate (CFR) is considered as one of the best measures to assess the health situation for any pandemic including Covid-19. It is measured by dividing the total number of deaths from Covid-19 on the total number of patients confirmed to be diseased with Covid-19.

### **Reasons for choosing the topic:**

Because of many reports reaching Public Health Department in Salahiddin Health Directorate of Iraq from many doctors working in Samarra city, and the results confirmed by Public Health Lab in Salahiddin Health Directorate, there was a warning alert about increasing number of deaths from Covid-19 in Samarra city that precede number of deaths in other cities in Salahiddin province. For this reason, it was important to estimate the exact CFR of covid-19 in Samarra city for the period of time from the beginning of the pandemic till the time of conducting this study and to find the epidemiological and clinical factors that may affect this rate.

### **Research Problem:**

To answer the questions:

1. Does the CFR of Covid-19 in Samarra city higher than other cities in Salahiddin province and the national rate in Iraq?

2. Are there any epidemiological or clinical factors that could be responsible for this different rate?

### **Previous studies:**

Although Covid-19 is a new pandemic, but there is a big number of studies done on it because of the wide spread all over the world countries.

According to WHO, in any infectious disease one of the most important characteristics that measure the severity of the disease is its ability to cause death, and Case Fatality Rate (CFR) is one of the best measures to estimate this.<sup>(1)</sup>

CFR of covid-19 is the proportion of death among identified confirmed covid-19 cases, and can be calculated through the following equation<sup>(2)</sup>:

$$\text{CFR of (covid-19)} = \frac{\text{number of death from (covid-19)}}{\text{number of diagnosed cases of (covid-19)}} \times 100$$

According to available data, CFR of covid-19 worldwide is (2.1), which resembles that of Iraq (2.14).<sup>(2)</sup> However, many factors may affect the accuracy of CFR estimates, because of the little information available about the new virus and its clinical course.

Among different health capacities, there is an expected difference in CFR because of the availability of health workers, resources and other facilities.<sup>(3)</sup>

The main problem with the estimation of CFR of covid-19 is the large number of asymptomatic cases, or patients with mild symptoms, who are not estimated in the total number of patients.<sup>(3)</sup>

### **Aim of the study:**

To explain the difference in CFR in Samarra General Hospital and to find the main possibilities behind this difference.

### **Patients and Methods:**

All deaths in Samarra General Hospital due to covid-19 from the beginning of the pandemic till the 12<sup>th</sup> of September 2020 were estimated, looking for the epidemiological characteristics of the patients died from this disease, and

evaluating the clinical findings and management lines used.

The patients files of deaths from covid-19 in Samarra General Hospital were copied and studied. The total number of deaths from covid-19 in Samarra city during this period of time was 81, from this number only (57) deaths was included in the study to look for any possible cause inside hospital. Any suspected cases with no confirmation test have been removed from this study.

The confirmation test considered for diagnosis of covid-19 was real time PCR done on oral swab. The statistical tool used is Microsoft Excel-2013.

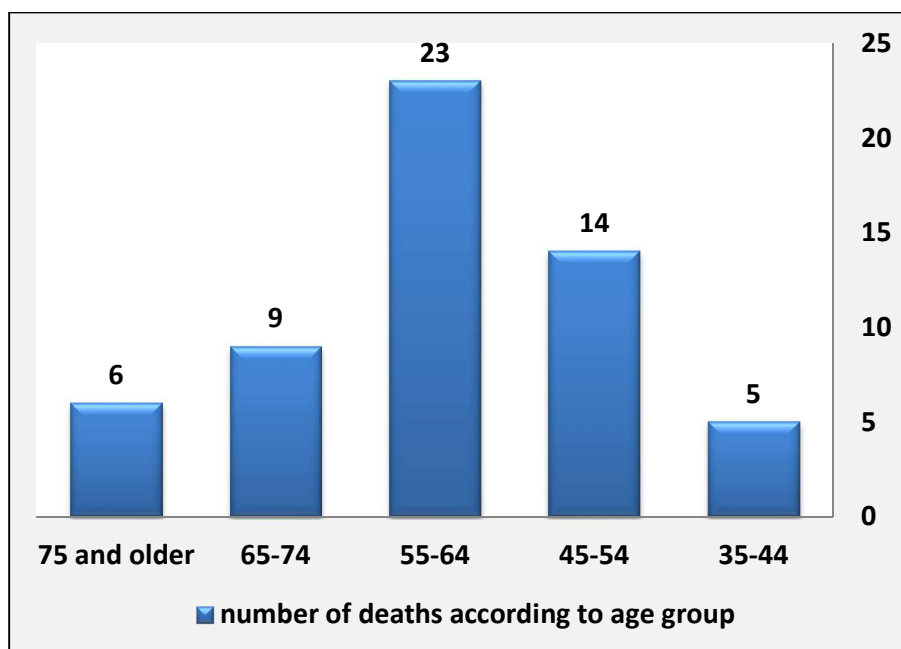
### **Results:**

The total number of deaths occurred in Samarra city from covid-19 was 81, from those 57 deaths occurred inside Samarra General Hospital, all of them were living in

Samarra city and the nearby suburban villages.

The main epidemiological features include:

1. The total number of confirmed cases of covid-19 in Samarra city was 815 cases, so **Case Fatality Rate** in Samara General Hospital from covid-19 was 6.6%.
2. From the total deaths, 41 (71.9%) were males, and 16 (28.1%) were females.
3. There were no deaths among those less than 35 years old, and the age groups of deaths were distributed as shown in figure (1). The mean age of the deaths was (58.5 years old).



**Figure (1):** distribution of deaths according to age groups

4. The average in-hospital residence period was 5.5 days.
5. Most of the patients (44 patients) received the needed treatment according to the management lines depended by WHO, although no
- one was referred to continuous positive airway pressure (CPAP).
6. There were enough health workers in Samarra General Hospital including senior doctors, nurses, and other health staff.

## Discussion:

According to the available data, CFR of covid-19 in Iraq is (2.14)<sup>(4)</sup> which means that CFR in Samarra General Hospital was higher than that of Iraq, and this could be attributed to the following:

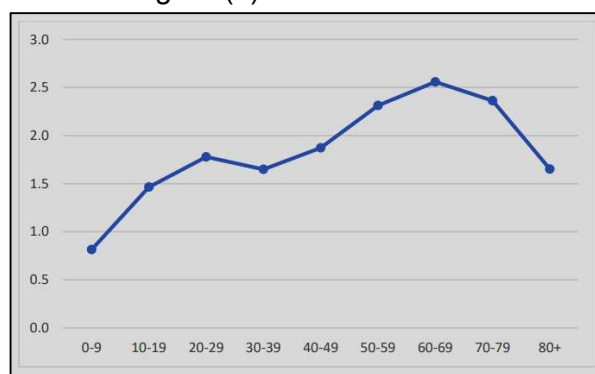
- The total number of confirmed cases of covid-19 could be much lower than the real number because most of the patients preferred to be treated in their home rather than consulting hospital, and this makes estimate of CFR higher than the actual rate.
- Delay of referring covid-19 patients to CPAP could be one of the most important clinical mistakes that increase the number of deaths among patients.
- More than half of the patients consulting hospital 2 days or less before death, which means that most of people preferred to be treated at home until reaching a progressive situation that may get no benefit from treatment.

However, there is no clear explanation for the difference between CFR in Samarra city and other Salahiddin province cities regarding the health facilities and community behavior. But some unique points should be studied further, including:

1. Most of Samarra city residents are attributed to few tribal relatives, and there is a need to do further studies about what could be certain genetic pre-disposability for this sort of viral infection.
2. Samarra city is one of the famous religious tourism cities in which many tourists from different countries mixed up with the people of Samarra city, and many of them are from Iran which shows the highest CFR worldwide.

Regarding other epidemiological features found in this study, the higher mortality among male resembling that of most countries except some few countries that showing higher female mortality rate than male.<sup>(5)</sup>

However, there are many hypothesis to explain that, like differences in occupation, lifestyle habits, and medical comorbidities. Some hypothesis discussed relation of age and sex and hormonal differences during different age groups for which this difference of mortality rate between two genders differ in different age groups as shown in figure (2).<sup>(6)</sup>



**Figure (2):** male-female ratio according to age groups

Regarding age groups, it is clear that deaths in Samarra city from covid-19 showed pattern similar to that of most countries, since there was no death below age of 35, and the largest death concentrated in the older ages especially above 50 years old, which is the oldest age group still active and has continuous contact with others rather than the other older age groups who are retired and has less contact with other population which may explain the drop of curve at the elderly age groups.

## Conclusion:

CFR of covid-19 in Samarra city was higher than that of Salahiddin province, and Iraq. There were some logical causes like delay of referring patients to CPAP and consulting hospital lately, but many other possibilities could be possible causes that need to be studied like genetic pre-disposability and spread of foreign type of viral infection.

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