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The unexpected effect of gathering on number of infection with COVID-19: During religious events in Iraq

Haider Noori Dawood

Al Immamin Al Kahdimin Medical city, Baghdad, Iraq

Corresponding author email: haidernoori2001@gmail.com

Chasib Latif Ali

Iraqi ministry of health, Baghdad, Iraq

Shaima Arif

Citizens affairs office, Iraqi ministry of health, Baghdad, Iraq

Abstract---Background: Coronavirus disease (COVID19) is an infectious disease that has spread throughout the world. Several contact-tracing studies provide suggestive evidence that large gatherings were responsible for some infection clusters early in the epidemic. But few, if any, studies examine experimental variation in the frequency of large events. Aim of study: To estimate the effect of gathering on number of infection with COVID 19: during religious events in Iraq. Patients and Methods: This a retrospective study, conducted all the conformed cases of COVID 19 infection, by polymerase chain reaction (PCR), in Iraq, from the Ministry of Healthy report, within four Arabic months (during Muharram and Safar in which the religious gathering events in Iraq, and the previous two months), 2021. And compared the rate of infection with COVID 19 between these four months. The patients divided into two groups middle and southern provinces (in which the high gathering occurred), and western and northern provinces (in which less gathering occurred),and compared the rate of infection with COVID 19 between them. Results: The average incidence of COVID-19 in Iraq during Muharram and Safar was 51117 confirmed cases. Thus, the overall average incidence of COVI-19 during these two months was 124.1/ 100000 population (0.12%), while in the two months before was 164.65/ 100000 population, however statistically not significant (p value 0.229).Incidence of COVID-19 population during Muharram and Safar months in Western and Northern provinces was 0.14 % and Middle and Southern provinces0.11%. Comparison of incidence rate of COVID-19 during certain days in Muharram and Safar showed

decreasing in the rate in Middle and Southern provinces more than decreasing in the rate in Western and Northern provinces. Conclusion: This study didn't show increasing number of COVID 19 in the religious events during Muharram and Safar in Iraq, in spite of mass gathering.

Keywords---gathering, COVID-19, religious events.

Introduction

In December 2019, cluster of the patients have pneumonia with unknown cause were linked to the seafood wholesale in Wuhan, in China (1). The emerging of this disease has been spread so rapidly from Wuhan to the other areas of China and then to other countries in the world. The virus which responsible about this epidemic of pneumonia designated as a SARS-CoV-2 by the International Committee on Taxonomy of Viruses (ICTV) (2) Since outbreak of the COVID-19, number of the patients had been increased dramatically, and some of patients had been died from this disease. High infectivity of the COVID-19 disease resulted in rapid increase of the new cases and worldwide outbreak (3). Coronavirus Disease (COVID-19) recognized as pandemic in March 2020 (4).

Mass gatherings defined as the preplanned public has been implemented at the mass gatherings to facilitate early events which are held for limited period of time and the detection of outbreaks and other health related events attended with more than 25,000 people. Length of and to enable the public health officials to respond in stay can be from several hours to several days (5). The high profile of international sporting events as the Olympics or World Cups in addition to international religious events as the Hajj consider as mass gatherings (6). The several contact tracing studies provided suggestive evidence that the large gatherings may responsible for some infectious clusters early in the epidemic. But few if any studies examine quasi experimental variation in frequency of the large events (7). In Karbala millions of the peoples come to this government in Muharram and Sugar to visit shrine of Al Imam AL Hussein from inside and outside of Iraq, may reach up to 16 million in the one season (8).

Patients and Methods

This a retrospective study, conducted all the conformed cases of COVID 19 infection, by polymerase chain reaction (PCR), in Iraq, from the Ministry of Healthy report, within four Arabic months (during Muharram and Safar and the previous two months), 2021. The incident of COVID 19 proved cases compared between those recorded during Muharram and Safar and the previous two months. The patients divided into two groups (middle and southern provinces, western and northern provinces). And compared the incidence of COVID 19 infection between these two groups, and the rate of infection during Muharram and Safarin both groups.

The incidence of COVID-19/ 100000 populations was calculated by dividing the number of confirmed cases by the total population and multiplying the result by

1000000. The total Iraqi population 2021, the total population in middle in Southern provinces, the total population in Western and Northern provinces took from the reports of Ministry of Planning.

Statistical Analysis

All statistical analyses were performed using SPSS statistical software, version 25 (IBM Corporation, USA) and Microsoft excel 2016. Descriptive statistics was used to present the data. The incidence of COVID-19/ 100000 populations was calculated by dividing the number of confirmed cases by the total population and multiplying the result by 1000000. Comparison in incidence rate between different geographical locations and different time points was performed using Student t-test. For all tests, a significant level of statistics was considered when $p < 0.05$.

Results

Based on the report of Ministry of Planning, the total Iraqi population in 2021 is 41,190,585. According to Ministry of Health report, the average incidence of COVID-19 in Iraq during Muharram and Safar was 51117 confirmed cases. Thus, the overall average incidence of COVID-19 during Muharram and Safar was 124.1/100000 population (0.12%). The total population in middle in Southern provinces was 24290890 population with an average of 27789 confirmed cases. Accordingly, the average incidence of COVID-19 in these provinces is 114.4/100000 population (0.11%). On the other hand the, the total population in Western and Northern provinces was 16899680 population with an average of 23328 confirmed cases. Accordingly the average incidence of COVID-19 in these provinces is 138.04/100000 population (0.14%). As in figure 1.

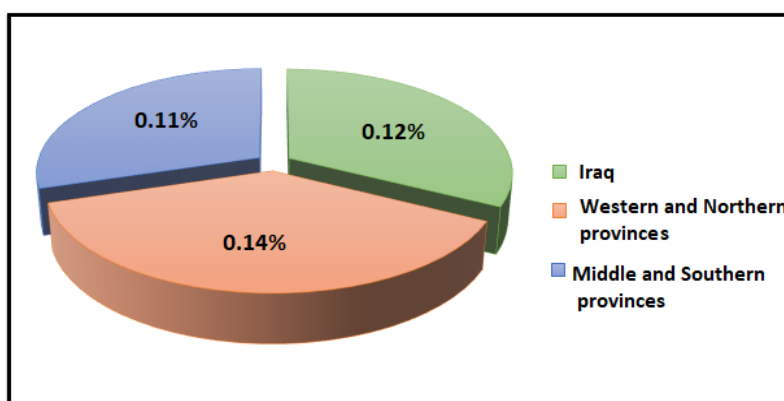


Figure 1: Incidence of COVID-19/100000 population during Muharram and Safar months in Iraq, Western and Northern provinces and Middle and Southern provinces

The incidence rate of COVID-19 in the beginning of Muharram and Safar was higher in Middle and Southern provinces than in Western and Northern provinces, but latter on the incidence rate of COVID-19 started to decline in

Middle and Southern provinces more than in Western and Northern provinces, as in figure 3.

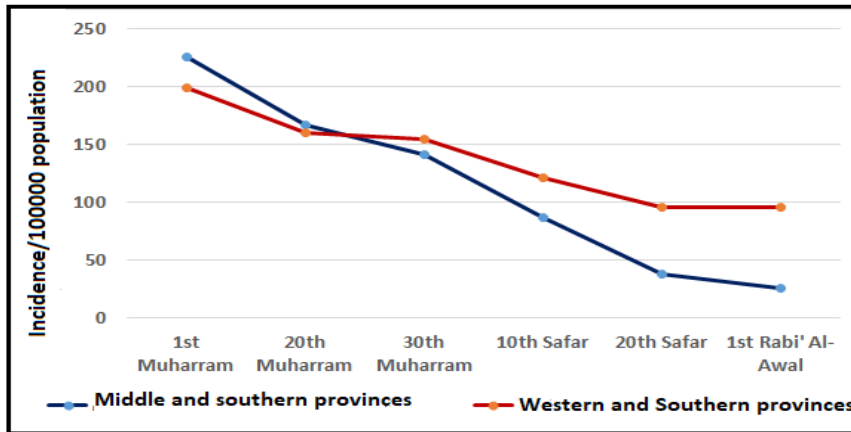


Figure 2: Comparison of incidence rate of COVID-19 during certain days in Muharram and Safar between Western and Northern provinces and Middle and Southern provinces

Overall average incidence rate/100000 of COVID-19 during in Muharram and Safar in Western and Northern provinces was 138.04 %, and in Middle and Southern provinces was 111.4, but statistically not significant (p value o. 526), as in figure 3.

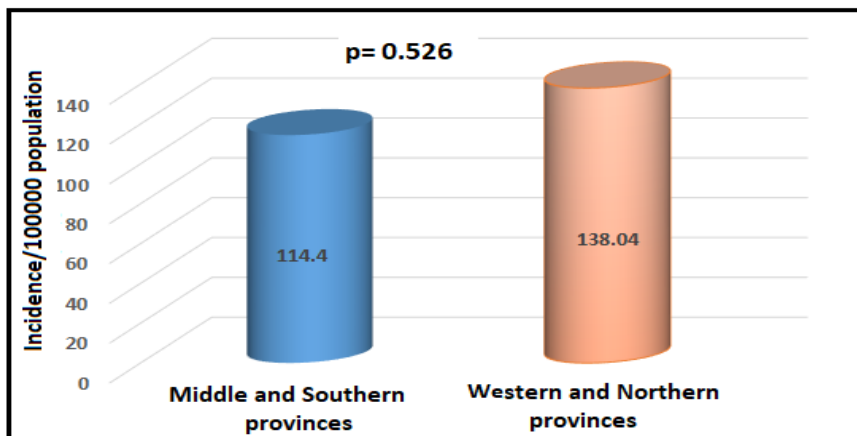


Figure 3: Overall average incidence rate/100000 of COVID-19 during in Muharram and Safar between Western and Northern provinces and Middle and Southern provinces

The incidence rate of COVID-19 in Muharram and Safar was lower than in the two months before Muharram, however statistically not significant (p value o. 299), as in figure 4.

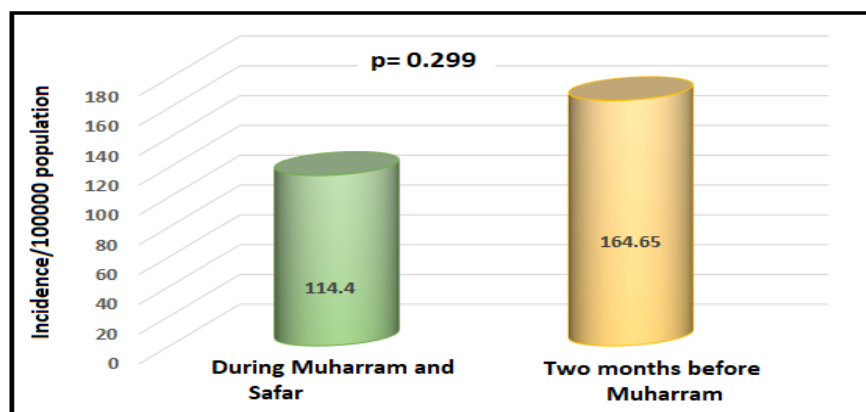


Figure 4: Comparison of incidence rate of COVID-19 between Muharram and Safar and two months before Muharram

Discussion

During Muharram and Safar there are two of the largest religious big mass gathering in Karbala in Iraq (Ashura and Arba'ein), during which millions of peoples come to Karbala from different areas of Iraq and also from many countries in the word. In this study the incidence of COVID 19 in middle and south provinces is less than that in north west provinces, however the people from middle and south of Iraq participate in these events more than those of north and western areas for geographic and ideals causes. Also this study showed that the incidence rate of COVID-19 is lower in middle and southern than in Western and Northern provinces during the two months (Muhram and Safar). This is the unexpected effect of gathering in this religious event. The epidemiological literature reports occasional influenza outbreaks at religious, music and sporting events (9). In Patrick study (10) which showed the effect of NHL hockey games, NBA basketball games, and NCAA basketball games between March 1 and March 11, 2020 on the COVID spread, in that study resulted in an additional 7520 COVID-19 cases. The possible explanation of difference in results that Patrick study participants were in indoor palaces and they stay in the same place all the game time , while the participant in our study were in outdoors, and they walk most of the time. According to the CDC (11), Indoor events, especially in places with poor ventilation, pose more risk than outdoor events, events that last longer pose more risk than shorter events, being within 6 feet of someone who has COVID-19 for a total of 15 minutes or more (over a 24-hour period) greatly increases the risk of becoming infected. These CDC data for infection do not come with our participant in the study, as they outdoor walking from different governments for long distances may reach hundreds of kilometers, and when they reach shrine of Al Imam AL Hussein they can't stay for long time.

In this study the incidence of COVID 19 was lower in mahram and safar than the two months before, this result go with that of Hayder study (12) who also studied the incidence of COVID 19 during 2020 same event in Iraq which showed that the number of Covid-19 cases decreased significantly despite the crowding during the visit. The mortality rate during these two months mildly decreased at the end of

Safar than at beginning of Muharram in all provinces of Iraq and in Middle and Southern provinces, this reduction is expected as the incidence of infection also mildly decreased in these areas. While in Western and Northern provinces mildly increased as the reduction of infection was lower than in other areas of Iraq. Gaughan study (13) showed that the majority of the variation in COVID-19 mortality risk was explained by controlling for sociodemographic and geographic determinants. Limitations of this study couldn't find the data of age and gender. In conclusion this study didn't show increasing number of COVID 19 in the religious events during Muharram and Safar in Iraq, in spite of mass gathering. More studies need during these two months in Iraq, because very large number of people accumulated in one government, which consider as a good sample for studies.

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