

study of the Relationship between Mortality Rate and Gender/Age factors Associated with Covid19 Virus in Kerbala, Iraq.

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Abstract:

Covid-19 caused by Cov-2 virus first reported in February 2020 in the Najaf province, Iraq. The virus infection spread from Najaf to other provinces particularly central and southern Iraq. Based on three factors including age, gender and medical history, this surveying study carried out on 600 individual among them 269 patients in Kerbala, Iraq in 2021. In this study, seven categories were included: less than 30, 31-40, 41-50, 51-60, 61-70, 70-80, and above 80 years old. The results showed that mortality rate among age categories 41-70 years for both male and female were higher than other categories. This higher rates were found to be associated mainly with people who were suffering from a previous health problems. The mortality rate was found 0.69% in people with history of other diseases compared to the counterparts with no history 0.31%. The age and gender were also considered in this investigation. The statistical analysis using Z test showed no significance difference in the mortality rate between male and female. Using Chi Square testing at (p < 0.1), the results showed significances differences in the mortality rate among the age category 51-60 years. It is a normal consequence for these ages that might be due to previous diseases history that weakening their immune system.

Keywords: Corona, Covid19, Cov2, gender, mortality rate

Introduction:

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first known case was identified in Wuhan, China in December 2019⁽¹⁾ The World Health Organization (WHO) declared a Public Health Emergency of International Concern on 30 January 2020, and a pandemic on 11 March 2020⁽²⁾ The major characteristics of Coronaviruses (CoVs) are considered sub-microscopically spherical enveloped particles with a positive-sense, single-stranded RNA. They belong to the SARS-CoV-2, the virus responsible for COVID-191, It is a member of the species in the Family subfamily Orthocoronavirinae, Betacoronavirus, coronaviridae subgenus (3) Sarbecvirus In another classification, subfamily Coronavirinae, family Coronavirdiae, order Nidovirales. There are four genera of CoVs called alphacoronavirus (α CoV), betacoronavirus (β CoV), deltacoronavirus (δ CoV), and gammacoronavirus (yCoV) According to the Chinese Centre for Disease Control, the new (SARS-CoV-2), is considered as a member of β -CoV lineage B ⁽⁴⁾ Some reports claimed that bats and rodents are the genomic sources of most α CoVs and β CoVs, while avian species are the gene sources of most $\delta CoVs$ and $\gamma CoVs$. ⁽⁵⁾ Covid-19 was also reported as a consequence for the genomic modification of the severe acute respiratory syndrome CoV (SARS-CoV) originally reported in China in 2003. It was

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found as a causal agent for an epidemic transmission of the SARS-CoV causing about 8000 infections and 800 deaths (mortality rate 9%) in 26 countries. This strain was followed, a decade later, by the appearance of another pathogenic coronavirus, known as Middle East respiratory syndrome coronavirus (MERS-CoV) that became an endemic in Middle Eastern countries in 2012.⁽⁶⁾ Mortality rates associated with covid-19 have been studied in relation to other factors like age, gender and previous disease history ⁽⁷⁾ The current pandemic novel corona virus (covid19) inflicted heavy human infection and death worldwide. According to the WHO dashboard globally, Globally, as of 4:14pm CET, 17 March 2022, there have been 462,758,117 confirmedcases of COVID-19 including 6,056 deaths, reported to WHO in 2020⁽⁸⁾ In Iraq, total infection cases as of March 17, 2022 are 2, 320,000 with total death 25,119 reported to WHO. Due to the lack of information in Kerbala governate (province) in Iraq, this surveying study was conducted to report for the first time, the mortality rate based on the age, gender and medical history.

Methodology

This study was conducted on a total population of 600 among them 269 of deceased (death) cases with coronavirus. It was carried out for the period from April – June, 2021. The data were collected from the Statistical Health Department in Kerbala based on their gender, age and medical history. Statistical analysis was applied on the collected data using Z and Chi Square testing.

The Results:

Based on using three factors: age, gender and medical history, this study was conducted to determine the mortality rate deceased patients after infection with covid-19. The results summarized in the (Table 1) showed that a higher percentage of mortality was found among men compared to the women.

Table 1. Statistical summary of the relationship between age categories, gender and medical history to the mortality rate

P-Value (pv)	Calculated Z	Infection %	Female Frequencies	Infection %	Male Frequencies	Frequencies	
PV in favor of Male	3.930337	0.42	112	0.58	157	Gender-based Classification	
pv	Calculated Z	Infection %	Frequencies for No Disease	Infection %	Frequencies for Disease Presence	Fr	equencies
PV in favor of No Disease	8.821423	0.69	185	0.31	84	Disease-based History Classification	
		P-Value	X ² Value	Theoretical Frequencies	Observed Frequencies	Age-based Mortality	
				29.88	10	Less than 30 years	
			-	29.88	12		31-40 years
				29.88	28		41-50 years
		P-Value	172.3983	29.88	53		51-60 years
				29.88	84		61-70 years
				29.88	60		71-80 years
				29.88	22		More than 81 years
269							Total
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The results showed that the deaths due to infection with the Covid19 was less among women (Figure 1).



Fig. 1: Mortality rate based on gender among people infected with Covid19 A higher percentage was found among death cases due to covid19 incorporated with the medical history of other chronicle diseases (0.69) compared to the counterparts with no history (0.31) of other diseases (Figure 2).



Fig. 2: Histogram showing the rate of infection based on history (green) and no history of a previous disease associated with Covid-19

The results also showed that, the highest percentage of mortality rate was among the infected cases within the ages category (61-70) years. This is followed by the age category of (71-80) years and then the age category of (51-60) years (Figure .3).





The results also showed the lowest percentage of deaths was among infected cases with Covid-19 within the age category groups 20-40 years. Similarly, low percentage was found among the deceased cases within the age category group greater than 91 years.

Chi Square testing at (p < 0.1), the results showed significances differences in the mortality rate among the age category 51- 60 years.

Discussion:

Covid-19 is a pandemic viral disease dramatically spread causing huge infection incidence (morbidity) and mortality rate throughout the world. The association of gender, age and the medical history has not been studied in Kerbala province in Iraq. The mortality rates varied remarkably among different nations depending on their life styles and healthcare systems ⁽⁷⁾. In addition to that, it was found that the frequency of diagnostic screening in non-symptomatic or moderately symptomatic patients probably effect the mortality rate ⁽⁹⁾.

In this study and based on data collected from the Statistical Health Department in the Kerbala Governate, covid-19 caused insignificantly death rate among men with about 0.58% compared to 0.42% among women. The difference in the immune response between men and women may be due to several reasons. The immune response is stronger in women compared to men, and this makes males more susceptible to many diseases that may lead to death compared to women ⁽¹⁰⁾. Gender differences in immune system have been previously reported and may considered advantageous for the female in case of Covid-19. Some biological factors may be responsible for this, such as the female hormone estrogen, which appears to play a role in strengthening the immune system. This is in consistence with a previous report concluded that Estrogen can produce a more effective innate immunity, hormonal immunity, and cellular immunity in response to viral infections ⁽¹¹⁾. These results are in agreement with many studies conducted in China and Korea, which showed that the percentage of death is greater among men compared to women than those who were infected with the Corona virus^(12,13).

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Reviewing studies indicated that there is a correlation between age development and natural immunity. The latter is declined gradually at older ages ⁽⁷⁾. The results of this study also indicated that people aged 50 years or older were significantly at higher risk of mortality than those younger than 50 years. accordingly, in old age, the large number of deaths in old age is due to the lack of production of natural immune T cells, B cells at age, which leads to a weakening of their immune system and thus less resistance to disease, which leads to exacerbation of symptoms and then death ⁽¹⁴⁾. These changes reduce the effectiveness of viral clearance. also angiotensin-converting enzyme2 (ACE2) the host cell receptor that the SARS-COV-2 coronavirus uses to invade human cells might play an important role in COVID-19 survival ⁽¹⁵⁾. Many studies have also confirmed that the elderly have increased susceptibility to gene expression responsible for the formation of the ACE2 enzyme responsible for introducing the virus into the host cell. In addition to the presence of many reasons such as lack of immunity and decreased effectiveness of organ functions, which leads to an increased risk of death when infected with the virus. ⁽¹⁶⁾

Chronic diseases are considered one of the important things that lead to death in patients with corona, which are more common in people over the age of 50, and the most common of these diseases are lung and chronic kidney diseases and cancer, As these diseases are associated with many immune infections and disorders in immune functions, which lead to death in patients with corona $^{(17,18)}$ As for the cause of death for infected patients in the young age groups, one of the causes of death may be the high level of cytokine protein, which the immune system produces when infected with the virus to kill it, This sudden and high level of cytokine leads to damage to some vital body organs such as the heart and lungs $^{(16)}$

Corona virus infection alone is considered a cause of death due to the production of cytokines, which leads to the infiltration of lymphoid and neutral immune cells into the lung tissue, which leads to its damage, High levels of cytokines lead to high body temperature, increased leakage from blood vessels, blood clots inside the body, low blood pressure and lack of oxygen, Increased acidity in the blood and fluid accumulation in the lungs(Multiple Organ Dysfunction Syndrome) ^{(19).}

White blood cells may shutdown the lungs (Acute Respiratory Distress Syndrome). Due to the formation of a hyaline membrane, composed of debris of proteins and dead cells, lining the lungs, which makes absorption of oxygen difficult. Most deaths due to COVID-19 are therefore due to respiratory failure ⁽²⁰⁾.

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