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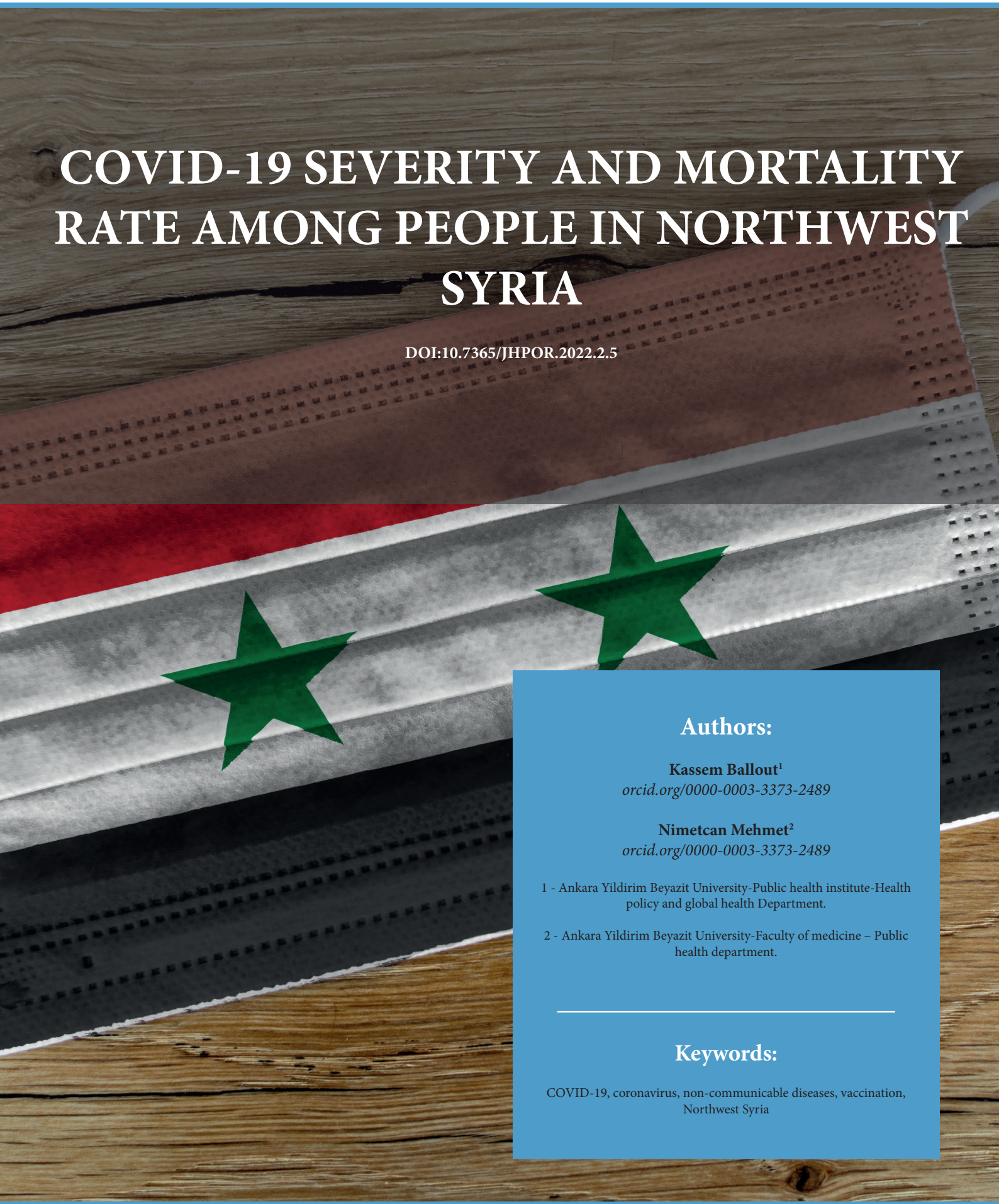

COVID-19 SEVERITY AND MORTALITY RATE AMONG PEOPLE IN NORTHWEST SYRIA

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ABSTRACT

Background: The first COVID-19 case in Northwest Syria (NWS) was detected by July 2020. The data were presented in the Early Warning and Alert Response Network (EWARN) regular reports and updates about the COVID-19 outbreak developments.

Methods: This research is a retrospective cross-sectional study of the COVID-19 reported cases in NWS, which is aimed to determine the impact of age, non – communicable diseases (NCDs), and vaccination status on the case severity and mortality rate among COVID-19 patients.
Results: By Oct 2021, there were 88,421 COVID-19 positive cases, 1,362 (1.54%) deaths were reported and 66,006 (74.65%) recovered. The severity of the clinical status of the COVID-19 cases increased with age going up, 58% out of the severe cases were for people 60+ years old, 7.7% of the server cases had at least one NCD, while it was less among people who got at least one dose of COVID-19 vaccines, only 0.8% of the cases had severe symptoms. 70% of the deaths were from the age group of people who were 60+ years old. The COVID-19 mortality rate among patients with NCD demonstrated that death was 5 times more among people with at least one NCD 7.1% compared to people without NCD 1.4%, and 99% of the cases didn't get vaccinated.

Conclusion: The severity of the disease increased with age, in the presence of any NCD. The study findings added more evidence that by increasing the vaccination coverage, more fatalities can be avoided, particularly among the elderly and those with NCDs.

Background:

COVID-19 is a disease caused by a virus named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and was discovered in December 2019 in Wuhan, China.[1] After a few months, it was spread throughout most countries of the world and considered pandemic by WHO in March 2020. COVID-19 is characterized clinically by respiratory symptoms ranging from a mild respiratory infection (including fever, cough, and fatigue) to pneumonia, acute respiratory distress syndrome (ARDS), shock, and death. Although the lungs are the most affected parts of the patient's body, other parts may also be affected by the inflammatory and immunological processes.

It is a very contagious disease and like other respiratory viruses, coronaviruses spread quickly through droplets that the patients generate when they sneeze, cough, speak, or even breath.[2] People of any age might get infected by SARS-CoV-2. Most people with COVID-19 have mild symptoms or sometimes no symptoms, but some people become severely ill.[2] Older people (more than 65), and people with pre-existing conditions (such as heart diseases, hypertension, diabetes, and respiratory conditions) appear to be more susceptible to becoming severely ill with the virus and suffer worse consequences.[3] The severe disease means that the person with COVID-19 may be hospitalized, need intensive care, require a ventilator to help them breathe, or die.[4] This is due to people living with NCDs being at increased risk of becoming severely ill with the virus as well as the disruption of health services is particularly problematic for those living with NCDs who need regular care.

In addition to symptomatic management, several therapeutic options are now available for the treatment of individuals with COVID-19,[5] and numerous randomized controlled trials (RCTs) are underway. However, uncertainties remain about the efficacy of existing treatments for COVID-19 – against emerging SARS-CoV-2 variants. Since treatment is not available in most countries, especially the low-income ones, all the developed and approved vaccines are highly effective at preventing severe diseases, hospitalizations, and deaths,[6] however, cases of infection are expected among fully vaccinated people, but limitations in global access to vaccines mean that many populations remain vulnerable. Even in vaccinated individuals, uncertainties remain about the duration of protection and efficacy of current vaccines,[7] the preventive measures are still valid and important to protect yourself and slow the spread of SARS-CoV-2; 1) keep the social distance at least 1 meter away from others, even if they don't have symptoms because they might be asymptomatic infected, 2) wear a mask especially when social

distancing is not achievable, 3) avoid crowded or poorly ventilated places, 4) clean surfaces regularly and avoid touching surfaces in public settings, 5) frequently clean your hands with soap and water, or an alcohol-based hand rub, 6) apply respiratory etiquette and cover your coughs and sneezes with a bent elbow or tissue, throwing used tissues into a closed bin right away. Then wash your hands or use an alcohol-based hand rub.

By March 4. 2022 there have been 440,807,756 confirmed cases of COVID-19, including 5,978,096 deaths, reported to WHO. As of 26 February 2022, a total of 10,585,766,316 vaccine doses have been administered.[8]

In Syria where the conflict during the last eleven years has created one of the most severe and complicated humanitarian crises in the world today by ongoing hostilities which have killed hundreds of thousands of people, triggered one of the worst displacement crises of our time, and led to the multisectoral collapse. Millions have left their homes and become internally displaced people inside Syria or refugees outside Syria. In Northwest Syria which is under the opposition groups' control and depends on crossing border modality from Turkey to get humanitarian assistance including health, there are about 4.4 million living there and almost 3.5 million are people in need.[9] The first case of COVID-19 in Northwest Syria was detected on July 9. 2020.[10] Northwest Syria has witnessed three waves of COVID-19 from Jul 2020 to Dec 2021. The third wave started in Aug 2021 and was the most severe wave of COVID-19 that hit Syria. In northwest Syria, the number of confirmed cases of COVID-19 almost doubled in Oct 2021,[11] reaching nearly 83,000 compared to about 41,000 cases recorded by the end of August 2021. The positivity rate of the tests reached 61% in Oct 2021. Worth mentioning that the vaccination activities against SARS-CoV-2 started in May 2021, when the first vaccination campaign was kicked off in Northwest Syria.[12] The target was vaccinating the health care workers who are on the front line dealing with suspected or confirmed COVID-19 cases in the health settings in addition to the high-risk population groups who were associated with chronic morbidities then extended to all individuals above 18 years old. By March 2. 2022, 98,213 confirmed cases of COVID-19 including 2,395 deaths. A total of 527,843 vaccine doses were administered with about 15.96% of the targeted population (more than 18 years old) being vaccinated.[13]

The study aimed to determine the impact of age, non – communicable diseases as co-morbidities, and vaccination status on the severity of the clinical situation and mortality rate of COVID-19 patients.

Materials and Methods:

Methods:

This is a cross-sectional study that was done retrospectively for people in NWS who were exposed to the SARS-CoV-2 virus and the study observed and analyzed the difference in the outcome.

Knowing that during the COVID-19 waves, the level of transmission reached level 4 of community transmission which means that anyone was exposed to get infected wherever you were living in NWS.

Data collection:

According to the health cluster preparedness plan, health settings in NWS were applying triage protocols at the entrance of the health settings as part of the Infection Prevention and Control (IPC) pillar - whether triage was applied in a dedicated space in the health setting or not. Well-equipped health workers were screening people who were seeking health care to identify if they had any symptoms, or signs of COVID-19 to be sent to the general practitioner in the same health setting for further assessment. Then if the case was a probable or a suspected case of COVID-19, EWARN focal points in the field would be contacted to arrange sampling whether in the health facility itself or the COVID-19 Community Treatment Centers CCTCs or the isolation COVID-19 center according to the case condition. The samples then were sent to the respected EWARN Polymerase chain reaction (PCR) lab in Idleb or Afrin regions to be tested. According to the results, EWARN teams and focal points were conducting contact tracing – if the results came positive- to collect samples from close contacts.

Moreover, to enhance the surveillance measures, EWARN teams were collecting random samples – from symptomatic and asymptomatic cases - as screening from the high-risk transmission areas, camps, and health settings. All the names were anonymous and unique patients' codes were used instead. All cases since the first detected case in NWS till the end of Oct 2021 were reported in the EWARN regular reports and updates about the COVID-19 development in NWS. In the group of study, all tested positive for COVID-19. The data collected were segregated by age, gender, place of living, vaccination status, if they had co-morbidities, especially non-communicable diseases or not, clinical status once diagnosed, and the outcome.

Results:

The study group consisted of a total of 88,421 positive COVID-19 cases in Northwest Syria. The samples were collected from the patients who met the definition of COVID-19 suspected case according to WHO definition.[14]

The samples were tested in 6 labs in NWS: 2 labs in Aleppo governorate and 4 labs in Idleb governorate.

Here in the discussion of the results, we will present the impact of the independent variables; age, non-communicable diseases as co-morbidities, and vaccination status on the severity and outcome of the COVID-19 infection taking into consideration the severity levels according to WHO that the person with COVID-19 may be hospitalized, need intensive care, require a ventilator to help them breathe, or die,[4] and the definition of death due to COVID-19 which is defined for surveillance purposes as a death resulting from a clinically compatible illness in a probable or confirmed COVID-19 case unless there is a clear alternative cause of death that cannot be related to COVID-19 disease (e.g., trauma). There should be no period of complete recovery between illness and death.[15] Knowing that according to WHO 80% of COVID-19 cases have mild or moderate clinical status while only 15% develop severe disease and need oxygen and 5% have critical disease.[2]

As shown in table 1, the majority 74,469 (84.22%) were in the 19 – 65 age group. Out of the study group, 50,095 (56.66%) were males. Northwest Syria had witnessed three waves of COVID-19 from Jul 2020 to Dec 2021. The third wave started in Aug 2021 and was the most severe wave of COVID-19 that hit Syria with about 62,437 confirmed COVID-19 cases which were 70.61% of the study group.

Regarding the COVID-19 associated deaths as demonstrated in table 2, there were 1,362 deaths as an accumulative number during the last three waves in NWS. The multitude of deaths was from the age group of people who were 60 and above years old with almost 70% of all deaths. Furthermore, including all reported cases in NWS by Oct 2021 and considering the age group 18 to 29 years old as a reference group – since it has accounted for the largest cumulative number of COVID-19 cases compared to other age groups, the mortality rate was 6.3 times higher in 50- to 59-year-olds, and 17.2 times higher in those who are 70 years and older. On top of that, the prevalence of severe clinical status increased as well as the age was going up. It was 3 times and 5.6 times in the age groups of 50-59 and 70+ respectively compared with the reference group 18- to 29-year-old.

For the non-communicable (NCD) cases in the study group, there were 1,698 (2%) patients who have at least one NCD. Most of them, 950 (41%) have hypertension, and 826 (35%) have diabetes while heart disease and chronic respiratory diseases were 11% and 9% respectively.
Patients with at least one NCD were shown with increasing severity of the COVID-19 infection and deteriorating clinical status of the patient. Only 0.2% of the asymptomatic patients had at least one of the NCDs, while the percentage increased to reach 7.7% of the server cases had at least one NCD. This means in other words that once they got infected by the virus, patients with chronic diseases had a much higher likelihood of having worse clinical outcomes than an average patient.

Furthermore, 9% of all deaths were for people who had at least one NCD. Calculating the COVID-19 mortality rate among patients with NCD (table 3) demonstrated that death was 5 times more among people with at least one NCD (7.1%) compared to people without NCD (1.4%) which indicates that those who have at least one NCD were more likely to die due to COVID-19.

The majority of deaths were among people with renal diseases, seizures, obesity, and cancer cases. The COVID-19 mortality rate among patients with Chronic Respiratory Disease was relatively low in comparison to other NCDs and it might be due to the misdiagnosing of the cases as asthma or COPD without matching the international criteria which lead to overestimating the total number of cases.

While for the vaccination impact, the prevalence of COVID-19 among vaccinated people (who got at least one dose) was significantly lower than those among unvaccinated ones, they were 2,625 (2.97%) and 85,796 (97.03%) respectively. Similar trends were noted for differences in the severity of the clinical status among these groups. 3.3% of the vaccinated people had mild symptoms while the percentage dropped to 0.8% in the severe symptoms group.

In the study group, the COVID-19 associated deaths were 1,351 (99%) and 11 (1%) deaths among unvaccinated and vaccinated persons, respectively. As shown in table 4, calculating the mortality rate among the vaccinated group indicates that those who took at least one dose of COVID-19 vaccines were three times less likely to die due to COVID-19 (0.4%) compared to those who didn't take vaccines (1.6%).

Taking into consideration age and existence of at least one NCD among the vaccinated people indicated that the COVID-19 mortality rate among infected people who were 60+ years old and got vaccines was (1%) compared to those who didn't get the vaccine (4.2%). Similarly, the mortality rate among infected people who had at least one NCD and got vaccines was (4.7%) compared to those who didn't get the vaccine (7.1%), as demonstrated in table 5.

Discussion:

During the last three waves of COVID-19 in Northwest Syria, there were 88,421 COVID-19 positive cases by end of Oct 2021 and 1,362 deaths. The severity of the clinical status of the COVID-19 cases was increased by 1) age going up, 295 (58%) out of 508 severe cases were for people 60+ years old, and 2) if the patients had at least one NCD 39 (7.7%). While it was less among people who got at least one dose of COVID-19 vaccines, only 4 (0.8%) cases had severe symptoms.

The majority of the deaths 951 (70%) were from the age group of people who were 60+ years old. Out of the deaths, there were 120 (9%) cases had at least one NCD. The COVID-19 mortality rate among patients with NCD demonstrated that death was 5 times more among people with at least one NCD (7.1%) compared to people without NCD (1.4%). And 1,351 (99%) cases didn't get vaccinated. All cases included in the EWARN report were for patients with positive results of SARS-CoV-2 only, which means in other words that the report doesn't include all the classified COVID-19 death cases (16), according to the WHO definition of the COVID-19 death case. Moreover, in the last wave of COVID-19 which reached the peak in mid of Sep 2021 with nearly 1500 daily cases, the occupancy rate of the COVID-19 dedicated hospitals reached 100% and exceeded 90% in the COVID-19 Community Treatment Centers CCTCs,[17] in addition to the severe shortages in the oxygen in the NGO supported health settings (18), which overwhelmed the capacity of the already-stretched health settings,[19] and obliged people to seek medical care in the privet sector which is already not well equipped due to the conflict challenges. In addition to a lack of well-qualified health staff due to the crisis who might already be negatively affected by the COVID-19 pandemic.[20,21] This means that not all COVID-19 cases or deaths were registered or even followed by the EWARN teams on the ground and the situation might be worse than reported. As per the above discussion, we can conclude that the severity of the disease increased with age, in the presence of a non – communicable disease, and if the patient was not vaccinated. The study findings added more evidence that by increasing vaccination coverage, more fatalities can be avoided, particularly among the elderly and those with non-communicable disorders.

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Tables:

Table 1: Sociodemographic factors of the patients Characteristics	N	%
Age group		
0 – 18 years	9,381	10.61%
19 – 59 years	70,038	79.21%
60 + years	9,002	10.18%
Gender		
Male	50,095	56.66%
Female	38,326	43.34%
Governorate		
Aleppo	35,283	39.90%
Idleb	53,138	60.10%
Live in a camp		
Yes	10,930	12.36%
No	77,491	87.64%
Clinical Status at the time of diagnosis		
Asymptomatic	9,414	10.65%
Mild	75,161	85.00%
Moderate	3,338	3.78%
Sever	508	0.57%
Vaccination Status		
Yes (at least one dose)	2,625	2.97%
No	85,796	97.03%
With at least one NCD		
Yes	1,698	1.92%
No	86,723	98.08%
Outcome		
Alive	21,053	23.81%
Deceased	1,362	1.54%
Recovered	66,006	74.65%

Table 2: The prevalence of severe clinical status and mortality rate among COVID-19 cases by age group:								
	0-5 years old	6-18 years old	19-29 years old	30-39 years old	40-49 years old	50-59 years old	60-69 years old	70+ years old
Cases	846	8,535	Reference group (25,811)	23,444	12,506	8,277	5,262	3,740
Clinical Status - Sever	7	8	Reference group (31)	1.4x (44)	1x (33)	3x (90)	3.9x (120)	5.6x (175)
Death	<1x (3)	<1x (18)	Reference group (33)	1.9x (62)	2.6x (87)	6.3x (208)	11.6x (382)	17.2x (569)

Table 3: The COVID-19 mortality rate per NCD				
	Total	The outcome of COVID-19 infection		COVID-19 mortality rate
		Total Deaths	Recovery and Alive	
Without NCD	86,723	1,242	85,481	1.4%
With at least one NCD	1,698	120	1,578	7.1%
1. Cancer	11	2	9	18.2%
2. Heart Diseases	269	36	233	13.4%
3. Hypertension	950	70	880	7.4%
4. Diabetes	826	72	754	8.7%
5. Chronic Respiratory Disease	199	6	193	3.0%
6. Obesity	9	3	6	33.3%
7. Seizures	4	1	3	25.0%
8. Renal Diseases	62	13	49	21.0%

Table 4: Mortality rate among vaccinated (at least one dose) and not vaccinated patients of COVID-19

	Total	The outcome of COVID-19 infection		COVID-19 mortality rate
		Total Death	Recovery and Alive	
Vaccinated (at least one dose)	2,625	11	2,614	0.4%
Not vaccinated	85,796	1,351	84,445	1.6%

Table 5: Mortality rate of the COVID-19 patients who were 60+ years old and those who have at least one NCD regarding the vaccination status.

	Total	The outcome of COVID-19 infection		COVID-19 mortality rate
		Total Deaths	Recovery and Alive	
60+ years old patients (Total: 9002 patients)				
COVID-19 cases for 60+ years old and got at least one dose of vaccines	142	6	136	4.2%
COVID-19 cases for 60+ years old and didn't get vaccinated	8,860	945	7,915	1%
NCD patients (Total: 1698 patients)				
COVID-19 cases with NCD and got at least one dose of vaccines	43	2	41	4.7%
COVID-19 cases with NCD and didn't get vaccinated	1,655	118	1,537	7.1%

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