Turk Thorac J 2021; 22(6): 473-476 DOI: 10.5152/TurkThoracJ.2021.21039

Original Article

Excess Deaths in Malatya in the COVID-19 Pandemic

Zeynep Ayfer Aytemur[1], Murat Yalçınsoy[1], Ahmet Kadir Arslan[2], Süleyman Savaş Hacıevliyagil[1]
[1]Faculty of Medicine, Department of Pulmonology, Inönü University, Malatya, Turkey
[2]Faculty of Medicine, Department of Biostatistics and Medical Informatics, İnönü University, Malatya, Turkey

Cite this article as: Aytemur ZA, Yalçınsoy M, Arslan AK, Hacıevliyagil SS. Excess deaths in Malatya in the COVID-19 pandemic. *Turk Thorac J.* 2021; 22(6): 473-476.

Abstract

OBJECTIVE: In our study, the effects of the COVID-19 pandemic in Malatya province, other than confirmed case deaths, were investigated.

MATERIAL AND METHODS: The records of those who died between 2016 and 2020 were reviewed on the official website of the Malatya Metropolitan Municipality, and the numbers of deaths in those 5 years were recorded on a weekly basis. The arithmetic mean of the deaths between 2016 and 2019 was calculated, and it was investigated whether the number of deaths in 2020 was more than expected.

RESULTS: In 2020, 1743 (61%) excess deaths were detected. While the mean number of deaths reported 4 years before 2020 was 2860, it was determined that the number of deaths in 2020 was 4603, and there were 1743 (61%) excess deaths.

CONCLUSION: The deaths occurred in Malatya during the COVID-19 pandemic were more than expected. It has been supposed that some deaths were of polymerase chain reaction negative and hence unrecorded COVID-19 patients' deaths, and some deaths were caused by other indirect effects of the pandemic.

KEYWORDS: COVID-19 pandemic, deaths, Malatya
Received: *February 12, 2021* ***Accepted:*** *June 13, 2021*

INTRODUCTION

In cases where the standard cannot be achieved in associating deaths with a disease, "excess death" is a concept that is used to measure the effect of a disease on public health; it refers to more deaths than expected under normal conditions and is used to measure the effect of a factor/problem on mortality when all causes of death are unknown.[1] Determination of excess deaths allows an understanding of the full impact of a problem such as a pandemic on mortality, including deaths that are not directly but indirectly caused by pandemic (such as delay in admission to hospital and getting healthcare).

In relation with the Address-Based Population Registration System Results, Turkish Statistical Institute (TurkStat) announced Turkey's population as 83 154 997 on February 4, 2020, and Malatya's population as 800 165 on December 31, 2019. In terms of total population, Malatya ranks 28th among the 81 provinces of Turkey.[2] We thought that the number of deaths announced did not reflect deaths due to pandemics according to our own clinical follow-up. In this study, it was aimed to detect excess deaths in Malatya, which has a population of 800 165, after start of COVID-19 pandemic in Turkey in March 2020, by comparing provincial number of deaths in the previous years with the number of deaths after beginning of the pandemic. Thus, we can gain insight into the impact of the pandemic on deaths.

MATERIAL AND METHODS

Daily death records of all those who died within the provincial borders of Malatya can be accessed from the title of "service guide link" on the official website of the Malatya Metropolitan Municipality.[3] The numbers of deaths on this website between 2016 and 2020 were examined on a daily basis, and the death numbers were recorded for each week. For each year, death numbers were recorded for 52 weeks. Weekly and annual average death rates over the 4 years were calculated. Excess deaths were calculated compared with the weekly and annual death rates seen in 2020. Since this study was a mortality study, the patient consent form was not used. In addition, the ethics committee approval was not obtained because hospital data were not used and publicly available data were used.

Statistical Analysis

Death number in every year studied was summarized as the median (min.-max.). The difference among the number of deaths in the studied years was examined with the Kruskal–Wallis H test. Post hoc pairwise analysis of the yearly death numbers was done with Conover test. A value of $P \leq .05$ was considered as statistically significant. The analyses were performed using "Kruskal–Wallis" software, written in Inonu University, Department of Biostatistics and Medical Informatics.[4] A box plot graph was used to show the distribution of the number of deaths by years, and a line graph was used to show the weekly number of deaths in each year. A bar graph was used to show the means of the number of deaths between 2016 and 2019, and excess deaths over expected deaths in 2020. The latter 2 graphs were drawn using The Statistical Package for Social Sciences version 26.0 software (IBM Corp.; Armonk, NY, USA).

Corresponding author: Murat Yalçınsoy, e-mail: mrtyalcinsoy@yahoo.com

Table 1. The Number of Deaths Concerning the Years

	Group					
Variable*	**2016**	**2017**	**2018**	**2019**	**2020**	***P***
Number of deaths	52.5# (36-84)	54# (38-74)	54# (32-74)	57# (36-82)	75# (38-194)	**<.001**

*Variables are presented as medians (min.-max.); #Significantly different compared to 2020.

RESULTS

It has been found that the median of the number of deaths in 2020 is significantly higher than the median of the number of deaths between 2016 and 2019 ($P < .001$) (Table 1). There were no statistically significant differences among the medians of the number of deaths between 2016 and 2019.

Distribution of death numbers by years is presented in Figure 1, and distribution by weeks is shown in Figure 2. An increase in the number of deaths in 2020, particularly starting at the 29th week of the year, is remarkable. The death numbers reached the highest level in the 37th and 38th weeks, and although they tended to decrease later, the weekly death numbers did not fall below 100 by the end of the 52nd week of 2020. Death numbers reached a plateau starting from the 40th week, and this plateau remained until the 52nd week of 2020, and the weekly number of deaths did not fall below 100. The weekly death numbers in the previous 4 years did not even reach 100. The mean number of deaths during the 4 years before 2020 was 2860; however, the number of deaths in 2020 was 4603, and there were 1743 (61%) excess deaths (Figure 3).

DISCUSSION

In this study, we investigated death numbers in 2020, including the 52nd week of the year, and we found that the death numbers in Malatya increased significantly in 2020 compared to the previous 4 years. This increase started particularly in the 29th week of the year, reached its highest level in the 37th and 38th weeks and then tended to decrease. It was determined that the death numbers reached a plateau starting from the 40th week, and this plateau remained until the 52nd week of 2020, and the weekly number of deaths did not fall below 100. On the other hand, the weekly death numbers in the previous 4 years did not even reach 100. The number of excess deaths calculated in Malatya, which has a population of 800 165, is 1743 for 2020. This result is significant for showing the impact of the COVID-19 on human deaths, causing a burden on the health system.

MAIN POINTS

- The deaths during the COVID-19 pandemic were more than those reported 4 years earlier.
- Excess deaths do not only include cases with COVID-19 but also include the deaths of all reasons.
- This result is significant for showing the impact of the COVID-19.
- Inadequate mortality data will negatively affect the scientific evaluation of pandemic.

Citing official data, BBC Turkish claimed that the number of deaths in 2020 was higher than the average number of previous years' deaths in 11 provinces of Turkey. E-government and TurkStat data confirm that the number of deaths increased by 12% in the first 8 months of 2020 in 11 provinces, including İstanbul, compared to the average of the last 5 years, with a total of 10 950 excess deaths. Malatya is one of those 11 provinces.[5]

Sayılı et al[6] investigated the increase in the death rate in İstanbul during the pandemic and reported that more unexpected deaths occurred in İstanbul in the first 2 months of the pandemic when compared to the reported number of pandemic-related deaths.[6] The authors reported 15-55% weekly increase in the mortality rate in the first 8 weeks and 3654 more deaths compared to the expected number. In another study from İstanbul, Yardım et al[1] investigated daily death records for 2020 and previous 3 years and analyzed the deaths until July 12, 2020. They found a difference of 5147 between the observed and expected deaths starting from March 11, 2020, when the first COVID-19 case was diagnosed, until July 12, 2020.[1] The authors claimed that there were 2412 unexplained excess deaths in İstanbul, since 2735 deaths were accounted in this period in Istanbul by Turkish Ministry of Health's report published on July 12, 2020. Musellim et al[7] also reported 4084 additional deaths between the 11th and 20th weeks of 2020 from Istanbul.

Excess deaths do not only include cases with COVID-19 but also include the deaths of all reasons. Those deaths include the deaths of the ones who cannot go to the hospital and get healthcare due to the fear of the pandemics, cancer cases whose diagnosis and treatment is delayed, and heart-related sudden deaths. It is hard to determine what percent

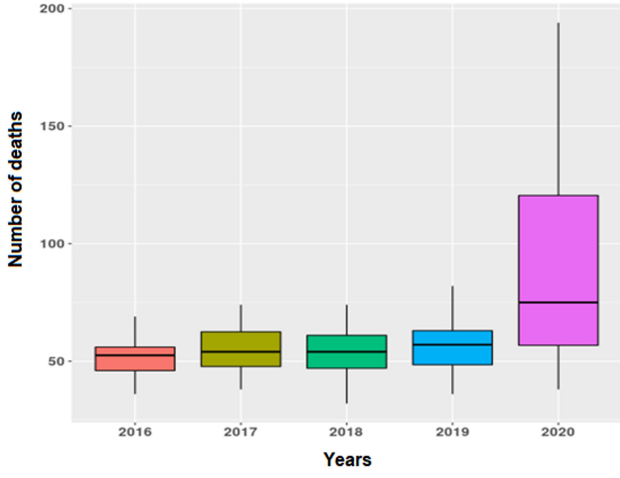

Figure 1. The distribution of the number of deaths concerning the years.

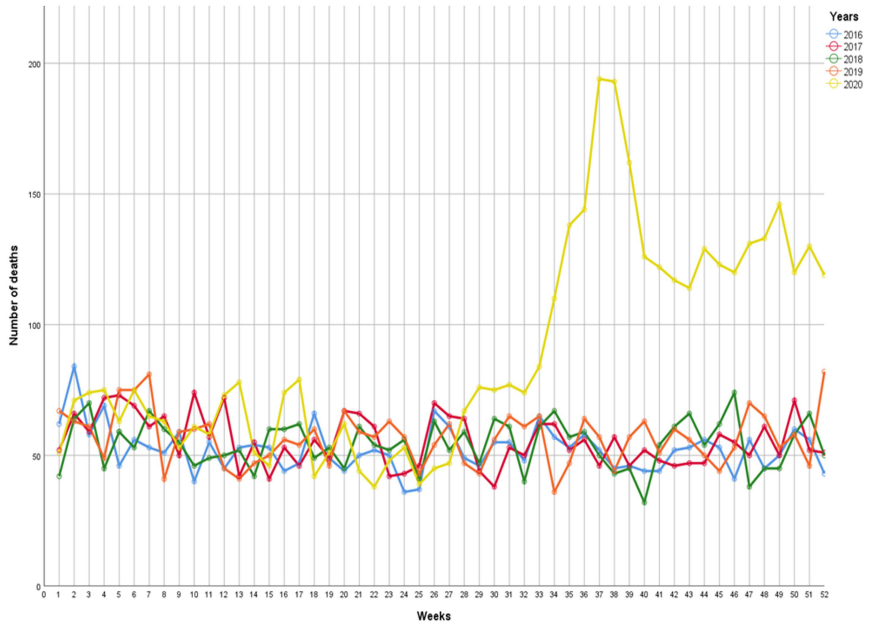

Figure 2. The weekly number of deaths between 2016 and 2020.

of these excess deaths is due to COVID-19. It is particularly hard to comment on the actual number of deaths directly resulted from the pandemic since the cause of death is reported as "infectious disease" in the death records of SARS-CoV-2 polymerase chain reaction negative (PCR –) COVID-19 cases. Prof. Onur Baser,[8] Head of Analytics Department in Colombian Data Analytics in New York and Head of Department of Economics at the MEF University, has stated taking the results of 11 provinces in Turkey into account that the pandemic-related deaths in Turkey may be over 4 times of the number officially announced.[8]

In our country, we think that only deaths of the SARS-CoV-2 PCR (+) cases are considered as the deaths due to the pandemic. In some cases we followed up, we witnessed that although the PCR test was positive at the beginning, COVID-19 diagnosis was not included in the death certificates of the cases if the PCR test repeated days later was negative. Possible errors in the sample collection technique or the timing of the sampling, contamination, and a long waiting time of the sample before testing can reduce the sensitivity of the PCR test up to 40% (1). In addition, despite a positive initial PCR test, not recording the cause of death as COVID-19 if the subsequent PCR is negative makes us think that official data on COVID-19-related death numbers are not reliable. More importantly, typical radiological findings of COVID-19 on thorax computerized tomography (CT) appear to have higher sensitivity and specificity in the diagnosis of COVID-19.[9] It has been shown that thorax CT provides a more reliable, more practical, and faster diagnosis and evaluation when compared to the PCR test in symptomatic

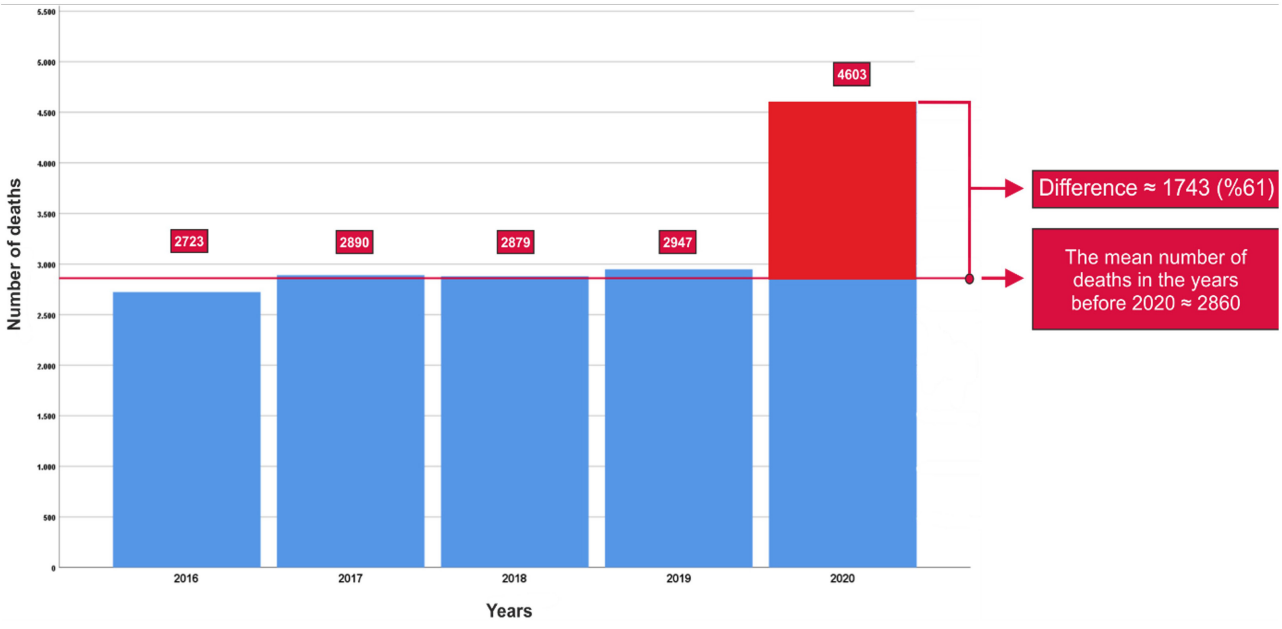

Figure 3. The mean number of deaths between 2016 and 2019, and excess deaths in 2020.

cases with clinical findings. Thorax CT seems to be more consistent in the diagnosis of COVID-19 in cases with typical clinical findings but an initial negative PCR.[10,11] However, the radiological findings of COVID-19 were not considered sufficient in our country for specifying COVID-19 diagnosis in the death report. It seems impossible to obtain reliable data unless all these problems are solved.

Although there are many determinants of the course of a pandemic, the main determinants are basic reproductive coefficient, rate of asymptomatic and mild cases, case death rate, contagiousness period of the agent, and success status of control measures. Since the first factors are related to the characteristics of the agent and it is not possible to change, the most important factors that can change the course of the pandemic are the application of control measures and the death rate in the case.[12] At the onset of an epidemic, the death rate cannot be determined precisely because asymptomatic and mild diseases are not fully recorded. Calculation is based on incomplete follow-up data due to delayed deaths. Comparisons between countries are difficult due to differences in the initially affected populations.[13] The European monitoring of excess mortality for public health action (EuroMOMO) network examined all-cause mortality rates in 27 European countries in October to December 2020. Excess mortality at week 46 was 15 392. It was examined in all age groups, and a slight increase was found in the 15-44 age group compared to the peak seen in spring 2020.[14] The estimates presented in our study represent excess deaths from all causes. The estimated excess mortality rate can be attributed primarily to the direct or indirect impact of the COVID-19 pandemic due to the absence of significant public health events other than COVID-19. These excess mortality rates are important to show the extent of the pandemic and to take necessary public health action.

This study had some limitations. First, this study is retrospective and the data were obtained from official websites. Due to the pandemic, there have been significant population movements. Intercity travel restrictions were present in some of the dates when the study data were used. However, the effect of population movements on the death rate is unknown, since this mobility cannot be calculated in the date range outside the restriction. Secondly, the number of people from neighboring provinces who came to our province and were buried here is not known.

We suggest that the inadequate mortality data will negatively affect the scientific evaluation of this severe pandemic, as well as the determination of the necessary measures to be taken in the future, the conduct of qualified scientific studies, and the quality of the healthcare in the future.

Ethics Committee Approval: The ethics committee approval was not obtained because hospital data were not used and publicly available data were used.

Informed Consent: Since this study was a mortality study, the patient consent form was not used.

Peer Review: Externally peer-reviewed.

Author Contributions: Concept – Z.A.A., M.Y., S.S.H.; Design – Z.A.A., M.Y., A.K.A., S.S.H.; Supervision – Z.A.A., M.Y., A.K.A., S.S.H.; Resources – Z.A.A., M.Y.; Materials – Z.A.A., M.Y., A.K.A., S.S.H.; Data Collection and/or Processing – Z.A.A., S.S.H.; Analysis and/or Interpretation – A.K.A.; Literature Search – Z.A.A., M.Y., S.S.H.; Writing Manuscript – Z.A.A., M.Y., A.K.A., S.S.H.; Critical Review – Z.A.A., M.Y., A.K.A., S.S.H.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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