ABCResearch

Arch Basic Clin Res 2023; 5(3): 372-377 • DOI: 10.5152/ABCR.2023.23171

Original Article

Deaths in 2020-2023 due to COVID-19: A Retrospective Analysis of Sociodemographic Features and Comorbidities

Hakan Gökalp Taş

Department of Anesthesiology and Reanimation, Erzincan Binali Yıldırım University, Faculty of Medicine, Erzincan, Türkiye

Cite this article as: Taş, H. G. (2023). Deaths in 2020-2023 from COVID-19: A retrospective analysis of sociodemographic features and comorbidities. *Arch Basic Clin Res.*, 2023;5(3):372-377.

ORCID iDs of the authors: H.G.T. 0000-0001-5680-9544.

ABSTRACT

Objective: This study aimed to examine deaths during 2020-2023 in our hospital from coronavirus-19 and preexisting characteristics of the patients (herein referred to as victims), such as age, gender, and comorbidity, by performing a retrospective analysis.

Methods: The hospital information management system was retrospectively analyzed for all coronavirus-19 related deaths between January 2020 and January 2023. Attention was paid to the patients' ages, genders, provinces of residence, marital status, and chronic illnesses.

Results: The mean age of the 623 victims was 75.9 ± 12.7 years. Male patients made up 58.3% of the deceased. When the victims were examined for comorbidities, it was discovered that 70.5% of the patients had cardiovascular system disease, 43.3% had endocrine system disease, 43% had respiratory system disease, 32.7% had central nervous system disease, 34.5% had hyperlipidemia, 24.4% had urinary system disease, and 10.1% had malignancy.

Conclusion: When the victims were compared with the examples in the literature, a similarity was discovered in terms of the distribution of their age, gender, marital status, endocrine system diseases, cardiovascular system diseases, chronic urinary system diseases, diabetes mellitus type I and II, hypothyroidism, and malignancy. Further, incidences of chronic respiratory system disease, diseases of the central nervous system, hypertension, chronic obstructive pulmonary disease, asthma, cerebrovascular accident, and hyperlipidemia were found to be extremely high in the province studied as compared with the literature.

Keywords: Coronavirus-19, critical care, mortality, morbidity

INTRODUCTION

On January 7, 2020, the Chinese Center for Disease Control and Prevention identified SARS-CoV2 in a patient who presented with atypical pneumonia, via a nasopharyngeal swab in Wuhan, China.[1,2] On March 11, 2020, the World Health Organization declared it a pandemic.[3] SARS-CoV2 spread rapidly across the globe, as evidenced by the World Health Organization's records of 6 844 267 deaths and 756 581 850 confirmed cases as of February 2023.[4] The mortality rate of this novel coronavirus is 2%, despite the fact that it often causes mild-to-moderate respiratory illnesses in people.[5]

Several retrospective analyses have suggested that deaths from coronavirus 19 (COVID-19) were caused by the consequent onset of severe acute respiratory distress syndrome (ARDS).[6] Coronavirus-19 related deaths can also be attributed to other illnesses such as cardiac arrhythmia, cardiac arrest, and pulmonary embolism.[7]

Worldwide, old age (>64 years) is considered to be the largest constant risk factor for death in critically ill COVID-19 patients.[6] At around the age of 80, COVID-19 cases have shown an increase in mortality.[8] The presence of ARDS, the requirement for mechanical ventilation, obesity, chronic heart disease, chronic respiratory system diseases, hypertension, diabetes mellitus type I and II, chronic urinary system diseases, malignancy, male gender, changes in inflammatory and coagulation marker levels, and organ dysfunctions are additional factors that raise mortality rates.[6]

Corresponding Author: Hakan Gökalp Taş, **E-mail:** hakangokalptas@hotmail.com

Received: March 29, 2023
Accepted: April 27, 2023
Publication Date: July 20, 2023

This study aimed to examine deaths during 2020-2023 in our hospital from COVID-19 and preexisting characteristics of the victims, such as age, gender, and comorbidity, by performing a retrospective analysis of COVID-19 deaths in the selected hospital between January 2020 and January 2023.

METHODS

Ethical Principles

The study was carried out in the selected hospital as retrospective observational research. The study was started after the clearance from the Clinical Research Ethics Committee of Erzincan Binali Yıldırım University (Date: March 16, 2023 Number: 2023-06/5) was received.

This manuscript adheres to the applicable STROBE guidelines.

Study Population

The hospital information management system and the death notification system were retrospectively analyzed for all COVID-19 related deaths that occurred between January 2020 and January 2023. The inclusion criteria for the study were all patients between the ages of 0 and 99 who died in the hospital between January 2020 and January 2023 due to COVID-19. Exclusion criteria were deaths caused by factors other than COVID-19.

Statistical Analysis

The patients' age, gender, province of residence, marital status, and chronic illnesses listed in the hospital information management system were analyzed. It was noted if the victims had a history of cardiovascular system diseases [hypertension, atherosclerosis, atrial fibrillation, arrhythmia, congestive heart failure (CHF)], endocrine system diseases (diabetes mellitus type I and II, hypothyroidism), respiratory system diseases [asthma, chronic obstructive pulmonary disease (COPD), pulmonary embolism], hyperlipidemia, central nervous system disease (Alzheimer's, Parkinson's, epilepsy, cerebrovascular accident), urinary system diseases (chronic kidney failure), or malignancy. The data were then statistically examined.

Data analysis was performed using the IBM Statistical Package for Social Sciences 25.0 (IBM SPSS Corp., Armonk, NY, USA) package program. Descriptive statistics are shown as mean ± SD for normally distributed variables, median (min–max) for non-normally distributed variables, and the number of cases, and percent for nominal variables.

MAIN POINTS

- A total of 623 people died (victims) as a result of coronavirus-19 (0.5%) between January 2020 and January 2023 of 118 194 patients who had reported to the hospital with coronavirus-19 symptoms.
- The coronavirus-19 victims in this study showed similarities with other several cases from the literature in terms of the distribution of their age, gender, marital status, endocrine system diseases, cardiovascular system diseases, chronic urinary system diseases, diabetes mellitus type I and II, hypothyroidism, and malignancy.
- This study's sample had incredibly high rates of chronic respiratory diseases, diseases of the central nervous system, hypertension, chronic obstructive pulmonary disease, asthma, cerebrovascular accidents, and hyperlipidemia, as compared with examples in the literature. Similarly, hypertension, cerebrovascular accident, and hyperlipidemia were at noticeably higher levels in this study's sample than in those in previous studies. This suggests that metabolic syndrome is highly prevalent in the studied region and emphasizes the necessity for additional study in this field.

RESULTS

A total of 118 194 patients with COVID-19 infection symptoms reported to the hospital during the said period. About 17 220 (14.5%) of the hospitalized patients were diagnosed with COVID-19, and 9907 (8%) of the diagnosed patients received inpatient care in our hospital. Of all, 623 (0.5%) of the diagnosed cases passed away. Figure 1 displays the distribution of COVID-19 patients who were admitted to the hospital between January 1, 2020, and January 1, 2023. The mean age of the 623 victims was 75.9 ± 12.7 years. About 84.4% of all deaths were in patients aged 65 and older, and 42.7% of all deaths were in people aged 80 years or older. Figure 2 displays the age breakdown of patients who passed away from COVID-19. Male patients made up 58.3% of the deceased. Further, 84.3% of them lived in the province of Erzincan, while 15.7% resided outside the province. About 56.8% of the victims were married, 40.4% were divorced, and 2.7% were single. About 70.5% of the victims had cardiovascular disease, 43.3% had endocrine system disease, 43% had respiratory system disease, 32.7% had central nervous system disease, 34.5% had hyperlipidemia, 24.4% had urinary system disease, and 10.1% had malignancy.

Among victims with cardiovascular system comorbidities, about 69.3% had hypertension, 36% had atherosclerotic heart disease, 17.8% had CHF, 14.1% had atrial fibrillation, and 10.4% had arrhythmia. Among victims with endocrine system conditions, diabetes mellitus type I and II affected 36.4%, while hypothyroidism affected 13.8%. Among victims with respiratory system disorders, 5.9% had previously suffered a pulmonary embolism, 24.4% had asthma, and 25.4% had COPD. Among victims with central nervous system disorders, 24.1% had a

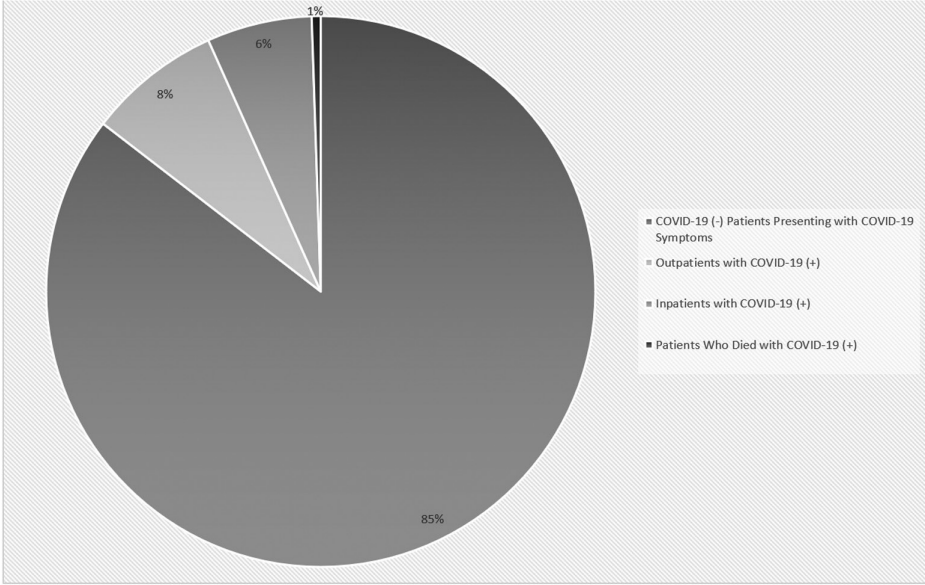

Figure 1. Proportional distribution of patients admitted to the hospital with COVID-19 symptoms. COVID-19, coronavirus disease 2019.

cerebrovascular accident, 10.9% had Alzheimer's, 4.3% had epilepsy, and 3% had Parkinson's. Chronic renal failure was found in 12.8% of the victims. Table 1 lists the diseases found in the victims.

DISCUSSION

This study compared the sample with examples found in the literature and found similarities in terms of the distribution of the patients' age, gender, marital status, endocrine system diseases, cardiovascular diseases, chronic urinary system diseases, diabetes mellitus type I and II, hypothyroidism, and malignancy. The selected province had extremely high rates of chronic respiratory diseases, central nervous system disorders, hypertension, COPD, asthma, cerebrovascular accidents, and hyperlipidemia when compared to the examples in the literature.

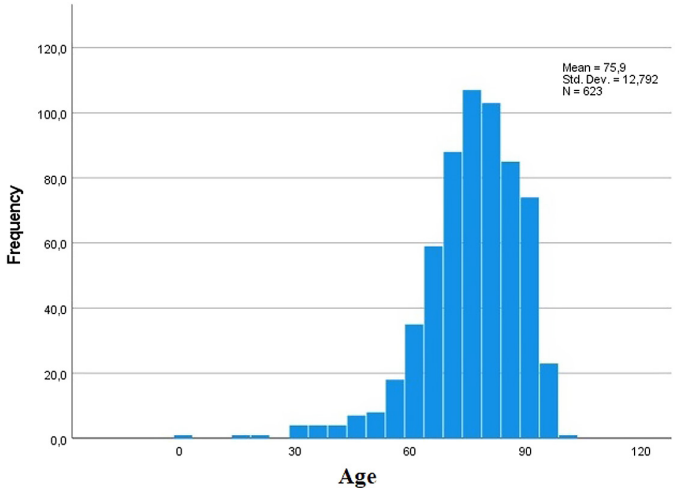

Figure 2. Age distribution of patients who died due to COVID-19. COVID-19, coronavirus disease 2019.

One of the single most significant risk factors for COVID-19 related mortality was found to be advanced age (>65 years).[6] Due to the age-related weakening of immune response against infectious diseases and concomitant comorbidities, diseases contracted at advanced ages are more fatal.[9] According to a study by Gupta et al,[8] the mortality rate of individuals over 80 years of age increases.

Further, the literature shows that the male gender is one of the key risk factors for mortality and that it accounted for the majority of deaths.[6] Reports have shown that testosterone accelerates the penetration of COVID-19 into cells or lays the groundwork for the virus's systemic dissemination.[9] About 58.3% of the victims in our study were men, which is consistent with other studies in the literature.

Prior studies have found that married or divorced patients made up the majority of the deceased; this could be attributed to the high average age of the deceased patient group.[10] Similarly, only 2.7% of the victims in this study were single.

According to Djaharuddin et al,[11] 42.31% of patients who passed away due to COVID-19 had hypertension, and 30.77% had cardiovascular disease. Another study found that the global COVID-19 mortality rate in hypertensive patients ranged from 9.5% to 73.8%.[12] ACE-2 (Angiotensin Converting Enzyme-2) inhibitors and angiotensin receptor blockers (ARBs) are often used to treat

Table 1. Comorbidities of Patients Who Died Due to COVID-19

Comorbidities	Number (n)	Percentage (%)
Cardiovascular system diseases	439	70.5
• Hypertension	432	69.3
• Atherosclerotic heart disease	224	36
• CHF*	111	17.8
• Atrial fibrillation	88	14.1
• Arrhythmia	65	10.4
Endocrine system disease	270	43.3
• Diabetes mellitus type I and II	227	36.4
• Hypothyroidism	86	13.8
Respiratory system diseases	268	43
• COPD**	158	25.4
• Asthma	152	24.4
• Pulmonary embolism	37	5.9
Hyperlipidemia	215	34.5
Central nervous system diseases	204	32.7
• CVA****	150	24.1
• Alzheimer's	68	10.9
• Epilepsy	27	4.3
• Parkinson's	19	3
Urinary system diseases	152	24.4
• CRF***	80	12.8
Malignity	63	10.1

*CHF, congestive heart failure; **COPD, chronic obstructive pulmonary disease; ***CRF, chronic renal failure; ****CVA, cerebrovascular accident.

hypertension. However, large doses of these inhibitors are thought to increase susceptibility to COVID-19 infection by upregulating the expression of the ACE-2 receptor.[13] In our study, 69.3% of the victims had hypertension, 36% had atherosclerotic heart disease, 17.8% had CHF, 14.1% had atrial fibrillation, and 10.4% had arrhythmia. Although the prevalence of cardiovascular disease was found to be 70.5%, the prevalence of hypertension alone was found to be rather high among the victims in this study when compared to studies in the literature. Further, previous studies have shown that diabetes mellitus type I and type II are one of the most prevalent comorbidities in COVID-19 victims, that is, responsible for 28%-58% of COVID-19 related deaths. In this study, 36.4% of the victims had diabetes. Although some studies suggest that hypothyroidism increases mortality,[14] certain publications claim that hypothyroidism has no appreciable impact on COVID-19 mortality;[15] about 13.8% of the victims in this study had hypothyroidism.

One of the most prevalent co-morbidities in COVID-19 related mortality is chronic respiratory disease. In a research work by Zhou et al,[16] 7% of COVID-19 victims had a history of COPD. Similar studies carried out in several nations, including China, Italy, and America, revealed that COPD was responsible for 4%-13.7% of deaths.[12] According to another study, 16% of victims had asthma.[17] In our study, about 25.4% had COPD, 24.4% had asthma, and 5.9% had a pulmonary embolism. About 43% of COVID-19 victims had at least one respiratory system disease. Therefore, it may be deduced that either chronic lung disorders are more common in this study region or that they have a greater impact on COVID-19 mortality in the given area.

Hyperlipidemia is not listed as prevalent comorbidity in COVID-19 victims in the literature.[11] Similarly, Wu et al[18] claimed that hyperlipidemia does not significantly affect mortality. However, in this study, hyperlipidemia was found to be comorbidity in 34.5% of the victims.

The World Health Organization has characterized metabolic syndromes by abdominal obesity, insulin resistance, hypertension, and hyperlipidemia. This combination of disorders, which first threatened Western civilizations, has spread across the entire world. The syndrome encourages the spread of chronic ailments such as type II diabetes, cardiovascular disease, and stroke.[19] The prevalence of hypertension, cerebrovascular accident, and hyperlipidemia in the victims in this study is at a significantly greater level than in previous studies. This is indicative of the high prevalence of metabolic syndromes in the community studied and highlights the need for further research in this area.

According to Lazcano et al, [20] COVID-19 increased mortality in patients with a previous history of cerebrovascular infarction. This study found that mortality rates rose up in people with cerebrovascular disease than in those without. In another study, 3.85% of COVID-19 victims had a history of non-traumatic cerebrovascular infarction.[11] Many research works have demonstrated how Alzheimer's disease increases COVID-19 disease mortality.[21] The risk of a severe clinical course, the rate of hospitalization, and mortality due to COVID-19 have all been linked to epilepsy alone.[22] Although Parkinson's disease is typically diagnosed in older people, there is no conclusive evidence that it increases mortality although it has been found to increase hospitalization and duration of stay.[23] In this study, 32.7% of the patients had neurological

comorbidity; the cerebrovascular accident was detected in 24.1% of the patients, Alzheimer's in 10.9%, epilepsy in 4.3%, and Parkinson's disease in 3% of the patients.

The literature also shows that chronic urinary system disorders are one of the most common comorbidities affecting COVID-19 related mortality. According to these studies, the mortality rate resulting from renal disorders ranges between 0.7% and 23.08%.[11] Similarly, in this study, chronic renal disease was found in 24.4% of the victims.

Another disease that sticks out as comorbidity is the presence of malignancy. In earlier research, malignancy was found in 2.8%-15.8% of victims.[11,12,24] Similarly, in this study, 10.1% of the patients had various malignancies.

Study Limitations

This study has several limitations, including the single-centered design, exclusion of deaths from COVID-19 in neighboring provinces and medical facilities, and lack of parameters to corroborate clinical suspicions about the rise in the prevalence of conditions such as metabolic syndrome. The literature will benefit from additional assessment of these concerns.

This study found striking similarities between the study sample and examples cited in the literature, in terms of the distribution of their age, gender, marital status, endocrine system diseases, cardiovascular system diseases, chronic urinary system diseases, diabetes mellitus type I and II, hypothyroidism, and malignancy. However, the study found incredibly high rates of chronic respiratory diseases, diseases of the central nervous system, hypertension, COPD, asthma, cerebrovascular accidents, and hyperlipidemia in the study sample as compared with those in the literature.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Erzincan Binali Yıldırım University (Date: March 16, 2023, Number: 2023-06/5).

Informed Consent: Since the study was conducted retrospectively on the death records of the patients who passed away in the hospital information system, written informed consent from the participants was not acquired. Permission was obtained from the hospital management where patient data were collected.

Peer-review: Externally peer-reviewed.

Acknowledgments: The authors thank all physicians and other staff of the Department of Anesthesiology and Reanimation, Erzincan Binali Yildirim University, Mengucek Gazi Training and Research Hospital, Erzincan, Türkiye.

Declaration of Interests: The author declare that he has no competing interest.

Funding: The author declared that this study has received no financial support.

REFERENCES

1. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020; 395(10223):507-513. [CrossRef]
2. Yılmaz A. General view on the COVID-19 infection factor and diagnosis. *Arch Basic Clin Res*. 2021;3(2):70-75. [CrossRef]
3. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395(10223):497-506. [CrossRef]
4. World Health Organization. *WHO coronavirus (COVID-19) dashboard*. WHO. 2023. Available at: https://covid19.who.int/
5. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395(10223):497-506. [CrossRef]
6. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA*. 2020;323(11):1061-1069. [CrossRef]
7. Sjoding MW, Admon AJ, Saha AK, et al. Comparing clinical features and outcomes in mechanically ventilated patients with COVID-19 and acute respiratory distress syndrome. *Ann Am Thorac Soc*. 2021;18(11):1876-1885. [CrossRef]
8. Gupta S, Hayek SS, Wang W, et al. Factors associated with death in critically ill patients with coronavirus disease 2019 in the US. *JAMA Intern Med*. 2020;180(11):1436-1447. [CrossRef]
9. Zhang JJ, Dong X, Liu GH, Gao YD. Risk and protective factors for COVID-19 morbidity, severity, and mortality. *Clin Rev Allergy Immunol*. 2023;64(1):90-107. [CrossRef]
10. Esmaeili ED, Fakhari A, Naghili B, Khodamoradi F, Azizi H. Case fatality and mortality rates, socio-demographic profile, and clinical features of COVID-19 in the elderly population: a population-based registry study in Iran. *J Med Virol*. 2022;94(5):2126-2132. [CrossRef]
11. Djaharuddin I, Munawwarah S, Nurulita A, Ilyas M, Tabri NA, Lihawa N. Comorbidities and mortality in COVID-19 patients. *Gac Sanit*. 2021;35(suppl 2):S530-S532. [CrossRef]
12. Ejaz H, Alsrhani A, Zafar A, et al. COVID-19 and comorbidities: deleterious impact on infected patients. *J Infect Public Health*. 2020;13(12):1833-1839. [CrossRef]
13. Fang L, Karakiulakis G, Roth M. Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection? *Lancet Respir Med*. 2020;8(4):e21. [CrossRef]
14. Lania A, Sandri MT, Cellini M, Mirani M, Lavezzi E, Mazziotti G. Thyrotoxicosis in patients with COVID-19: the THYRCOV study. *Eur J Endocrinol*. 2020;183(4):381-387. [CrossRef]
15. Daraei M, Hasibi M, Abdollahi H, et al. Possible role of hypothyroidism in the prognosis of COVID-19. *Intern Med J*. 2020;50(11):1410-1412. [CrossRef]
16. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*. 2020; 395(10229):1054-1062. [CrossRef]

17. Ren J, Pang W, Luo Y, et al. Impact of allergic rhinitis and asthma on COVID-19 infection, hospitalization, and mortality. *J Allergy Clin Immunol Pract*. 2022;10(1):124-133. [CrossRef]
18. Wu B, Zhou JH, Wang WX, et al. Association analysis of hyperlipidemia with the 28-day all-cause mortality of COVID-19 in hospitalized patients. *Chin Med Sci J*. 2021;36(1):17-26. [CrossRef]
19. Saklayen MG. The global epidemic of the metabolic syndrome. *Curr Hypertens Rep*. 2018;20(2):12. [CrossRef]
20. Lazcano U, Cuadrado-Godia E, Grau M, et al. Increased COVID-19 Mortality in people with previous cerebrovascular disease: a population-based cohort study. *Stroke*. 2022; 53(4):1276-1284. [CrossRef]
21. Xia X, Wang Y, Zheng J. COVID-19 and Alzheimer's disease: how one crisis worsens the other. *Transl Neurodegener*. 2021;10(1):15. [CrossRef]
22. Clift AK, Coupland CAC, Keogh RH, et al. Living risk prediction algorithm (QCOVID) for risk of hospital admission and mortality from coronavirus 19 in adults: national derivation and validation cohort study. *BMJ*. 2020;371:m3731. [CrossRef]
23. Papa SM, Brundin P, Fung VSC, et al. Impact of the COVID-19 pandemic on Parkinson's disease and movement disorders. *Mov Disord*. 2020;35(5):711-715. [CrossRef]
24. Du RH, Liang LR, Yang CQ, et al. Predictors of mortality for patients with COVID-19 pneumonia caused by SARS-CoV-2: a prospective cohort study. *Eur Respir J*. 2020;55(5), [CrossRef]