

Research Paper

Clinical Characteristics and Risk Factors of COVID-19 and Related Deaths in Elderly Patients



Zoya Hadinejad<sup>1</sup>, Yahya Salehtabari<sup>2</sup>, Seyedeh Zeinab Sajadi<sup>2</sup>, \*Hassan Talebi Ghadicolaei<sup>2</sup>

1. Research Center in Emergency and Disaster Health, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.  
 2. Research Center in Emergency and Disaster Health, Mazandaran University of Medical Sciences, Sari, Iran.



**Citation:** Hadinejad Z, Salehtabari Y, Sajadi Z, Zare E, Talebi Ghadicolaei H. [Clinical Characteristics and Risk Factors of COVID-19 and Related Deaths in Elderly Patients (Persian)]. Iranian Journal of Ageing. 2021; 16(1):128-139. <https://doi.org/10.32598/sija.16.1.658.2>

**doi:** <https://doi.org/10.32598/sija.16.1.658.2>



**Received:** 06 Feb 2021  
**Accepted:** 20 Mar 2021  
**Available Online:** 01 Apr 2021

**Key words:**  
 Clinical findings, Coronavirus Disease 2019 (COVID-19), Elderly, Risk factors

**ABSTRACT**

**Objectives** The elderly are at higher risks for developing Coronavirus Disease 2019 (COVID-19). Besides, when generating the illness, they have a higher risk of death. Recognizing clinical characteristics and risk factors associated with morbidity and mortality in the elderly is necessary to prevent mortality in similar infectious diseases.

**Methods & Materials** This descriptive research explored the data of all geriatrics admitted following COVID-19 in the medical centers affiliated with Mazandaran University of Medical Sciences. These data were collected from February 20, 2020, to February 20, 2021. Data analysis was performed by SPSS using logistic regression analysis. P<0.05 was considered significant.

**Results** Of the total 54523 patients admitted to the medical centers in the 12 months, 25218 patients were elderly. In total, 51.05% and 12343 of the patients were female and male, respectively. In total, 3512 elderly were expired. The death cases included 1814 (51.65%) males and the rest were females. Moreover, 16203 patients were in the age group of youngest-old, aged 60-75 years; 8270 patients were middle-old, 76-90 years; and the oldest-old category included 745 patients in the age group of ≥90 years. There was a significant relationship between age, gender, and COVID-19-induced death in the elderly (P<0.05). Older adults presented the highest death rate due to this disease Men were 10% more prone to die from COVID-19 than women. Major comorbidities recorded in this population were kidney diseases (92%), cancer (76%), diabetes (32%), and cardiovascular diseases (17%).

**Conclusion** Preventive measures to support the elderly are essential to combat the COVID-19 pandemic. Furthermore, it is essential to focus on the specific health needs of the elderly, such as proper nutrition, wellbeing, and mental health promotion.

**Extended Abstract**

**1. Introduction**



A group of patients with pneumonia of unknown cause were identified in Wuhan, China in late December 2019. The World Health Organization (WHO) has declared

the epidemic of Coronavirus Disease-2019 (COVID-19). The virus rapidly spread throughout China and almost all over the world in less than 4 months due to the very high transmission power.

The first case of COVID-19 in Iran was reported on February 19, 2020, in Qom. Currently, more than 1 year after the outbreak of this disease in Iran, 1746953 cases have

**\* Corresponding Author:**

Hassan Talebi Ghadicolaei, MSc.

**Address:** Research Center in Emergency and Disaster Health, Mazandaran University of Medical Sciences, Sari, Iran.

**Tel:** +98 (912) 4585974

**E-mail:** h.talebi@mazums.ac.ir

been infected and 61230 deaths due to this disease have been reported until March 15, 2021. The elderly were age groups, i.e., least screened in this pandemic and at the highest risk. Older people are at higher risks for developing COVID-19 and are more prone to expire after generating the illness. The older the age, the greater the risk due to the adverse impact of comorbid and underlying diseases.

Therefore, the current research aimed to investigate the clinical characteristics and risk factors for morbidity and mortality of the elderly hospitalized in medical centers in Mazandaran Province, Iran. We aimed to better understand the risk factors for COVID-19 in this vulnerable age group to prevent further infection and mortality in the subsequent waves of the disease and similar infectious diseases.

## 2. Materials and Methods

In this retrospective analytical study, demographic information, symptoms, and clinical manifestations of all elderly patients aged over 60 years who were admitted with a diagnosis of COVID-19 in the medical centers of Mazandaran University of Medical Sciences were examined; these patients were admitted from March 2019 to March 2020. The samples were collected by the experts of the Emergency Operations Center (EOC) unit of the Accident Management Center per the format provided by the relevant ministry. Information, including age, gender, date of hospitalization, the place of residence, the number of hospitalization days, the signs and symptoms of the patient at the time of admission (fever, cough, headache, shortness of breath, decreased level of consciousness, etc.), history of smoking and drug abuse, SPO2 level, the CT-SCAN findings of the patient's lung, and the presence of underlying diseases were extracted from the medical records of these patients.

The variables were described in frequency and percentage. The multivariate logistic regression model was used to investigate COVID-19-related death factors in the elderly. All calculations were performed using SPSS. P0.05 was considered significant. The inclusion criterion was

all elderly patients who were admitted with a diagnosis of COVID-19 to the medical centers affiliated to Mazandaran University of Medical Sciences in one year. Besides, the exclusion criterion included elderly with missing information and not admitted in the mentioned period.

## 3. Results

A total of 54523 patients were hospitalized in 1 year; of whom, 12875 elderly women (51.05%) and the rest (12343) men were infected by the coronavirus. The relevant mortality rate was 3512 subjects and the mortality frequency was >13 individuals per 100 cases among the hospitalized elderly. In terms of the classification of the elderly, 16203 cases were in the age group of 60-75 years, 8270 subjects were in the age group of 76-90 years, and the rest were 745 individuals were in the age group of  $\geq 90$  years (Table 1).

According to the results of multivariate logistic regression, there was a significant relationship between age (60-75 years;  $P < 0.001$ ,  $OR = 0.33$ ), (76-90 years;  $P < 0.001$ ,  $OR = 0.59$ ), gender ( $P = 0.007$ ,  $OR = 1.107$  OR), and COVID-19-induced deaths in the elderly ( $P < 0.05$ ). In other words, patients aged 60-75 years presented a lower odds of death induced by COVID-19, compared to the older age groups. The odds of COVID-19-induced death were higher in older age groups. Men were 1.107 times more prone to die from COVID-19 than women. Moreover, men were 10% more prone to die from COVID-19 than women.

There was a significant relationship between diabetes ( $OR = 1.32$ ), heart disease ( $OR = 1.17$ ), kidney disease ( $OR = 1.92$ ), cancer ( $OR = 1.76$ ), and COVID-19-induced death in the explored elderly. In other words, the odds of death from COVID-19 increased in the elderly with heart disease by 17%, diabetes by 32%, cancer by 76%, and kidney disease by 92%.

**Table 1.** Infection rate based on age and sex of the elderly

Age Groups, y	No.	Female (%)	Male (%)
75-60	16203	8670	7533
90-76	8270	3928	4342
$\geq 90$	745	277	468
Total	25218	12875 (51.05)	12343 (48.95)

#### 4. Discussion and Conclusion

According to the current research findings, the highest incidence of COVID-19 was reported as 46.25% in the age group of  $\geq 60$  years. Deaths from COVID-19 increased by 92% in the elderly with kidney disease, 76% in cancer, 32% in diabetes, and 17% in the elderly with heart disease, respectively.

Aging, immunosuppression, and underlying diseases are the major predisposing factors for COVID-19. Immunosuppression, reduced organ function, and poor health management have exacerbated the elderly's exposure to the virus. The improper regulation of the immune system and excessive inflammation significantly increased the pathophysiology of COVID-19 in addition to enhancing susceptibility/pathogenicity and virus infection. As a result, the severity of the disease and mortality increases in the elderly.

According to the obtained data, the elderly with COVID-19 with a history of underlying disease were more prone than other patients with COVID-19 to generate a severe form of the disease with the symptoms of respiratory distress; thus, such conditions can lead to the death of the patient.

Preventive measures are essential to assist the elderly to cope with the epidemic of the virus, including focusing on the specific health needs of the elderly, such as proper nutrition, wellbeing, and mental health promotion. Interventions, such as self-care training and prevention methods can help improve the health status of this population.

#### Ethical Considerations

##### Compliance with ethical guidelines

The present study was approved by the Ethics Committee of Mazandaran University of Medical Sciences (Code: IR.MAZUM.REC.1399.7848) on August 28, 2020.

##### Funding

This study was supported by the Vice-Chancellor for Research and Technology of Mazandaran University of Medical Sciences

##### Authors' contributions

Conceptualization and supervision: All authors; Methodology, data analysis: Ebrahim Zare; Investigation, data collection, resources: Zeinab Sajadi; Writing – original draft: Zoya Hadinejad; Writing – review & editing: Hassan Talebi;

Validation, project administration and supervision: Yahya Saleh Tabari.

##### Conflicts of interest

The authors declared no conflicts of interest.

##### Acknowledgements

The authors want to thank all staff of Mazandaran Medical Emergency and Accident Management Center.