Physiology International 109 (2022) 2, 177–185
DOI: 10.1556/2060.2022.00203

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COVID-19 and the elderly

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Received: November 10, 2021 • Revised manuscript received: February 14, 2022 • Accepted: March 1, 2022
Published online: May 16, 2022

ABSTRACT

COVID-19 has become a great burden of the world in respect of health care, social, and economical reason. Several million people died worldwide so far and more and more mutants are generated and spread. Older people with co-morbidities and frailty syndrome have a significantly higher risk to get the infection and also higher the risk of a more serious disease process. Mortality of COVID-19 is also higher in case of geriatric patients.

In this review we attempted to summarize the factors of the higher susceptibility for more serious disease, what actions need to be taken for defending older patients and also special aspects of clinical presentation including ophthalmic symptoms.

KEYWORDS

elderly, ageing, geriatric, COVID-19, pneumonia, venous thromboembolism

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INTRODUCTION

Victims of a new disease have been reported caused by a so far unknown coronavirus at the end of 2019. The virus has titled severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). In February 2020, the World Health Organization designated the disease as coronavirus disease 2019 (COVID-19) and also declared the COVID-19 outbreak a global pandemic on March 12, 2020.

The infection has quickly spread from China to all over the world causing a new pandemic. So far (2nd of November), pandemic has claimed 247,909,306 cases and 5,021,747 deaths worldwide and 876,497 cases and 30,920 deaths in Hungary [1].

There are risk factors for COVID-19 infection and for having a more serious disease. These are obesity, type 2 diabetes mellitus, any kind of immunodeficiency and chronic obstructive pulmonary diseases etc.

Older people have also a greater risk for COVID-19 infection and a more severe manifestation of the disease. Indeed, advanced age is the highest risk factor for severe disease. Mortality of patients over 65 years proved to be higher than that of patients with a lower age [2].

MORTALITY OF THE ELDERLY PEOPLE DUE TO COVID INFECTION

COVID-19 pandemic have resulted significant mortality. Case fatality rate (CFR) varies widely in the different countries depending on the screening intensity, the vaccination rate, the proportion of elderly in the population, the performance of the health care system and the epidemiological policy of the given country. CFR is also differing over time: as the knowledge about the virus and the treatment possibilities are increasing, the CFR began to decrease. While the CFR was reported to increase until May 2020. to 7.23%, a declining trend could be observed until December 29–31, 2020. to a CFR value of 2.2% [3].

Mortality rate of 70-79-year-old patients is 8%, while this is 15% in adults older than 80 years and only 3.6% in case of patients 60–69 years [4].

According to the international multicentre HOPE-COVID-19 registry the in-hospital mortality rates of the included 5,746 patients (2,676 were <65 and 3,070 ≥ 65 years) were reported to be 6.8% and 32.1% in the younger and older cohort, respectively [5].

Aging population accounts for 80% of all COVID deaths. Residents of nursing homes constitute half of COVID-victims of older age [6] demonstrating the higher susceptibility and vulnerability of the elderly.

Frailty is defined as a clinically recognizable syndrome of older adults with increased vulnerability, resulting from age-associated declines in physiologic reserve and function across multiple organ systems, such that the ability to cope with everyday or acute stressors is compromised. Prognosis of older COVID-patients with frailty syndrome is particularly bad [7].

WHY IS THE ELDERLY POPULATION AT INCREASED RISK FOR COVID-19 DISEASE?

One of the most important factor that is responsible for the increased risk of the elderly is the frequent occurrence of multimorbidity. Older people are often presenting with two or more

chronic diseases. According to the results of the HOPE-COVID-19 project carried out with hospitalized patients due to COVID infection, the 83.9% of patients ≥65 years had at least 1 comorbidity, while the 24.8% had ≥3 comorbid diseases, compared to the 4.0% of the younger counterpart [5]. Among the comorbidities, congestive heart failure, chronic obstructive pulmonary diseases, chronic renal failure, atherosclerosis, type 2 diabetes mellitus are the most prominent. Dementia and hypertension is also reported to be a relevant diagnosis of the elderly people with a bad outcome of COVID-infection [8].

A high percentage of older people are living in nursing-home. Gated community and inappropriate application of the epidemiological measures may also enhance dissemination of the infection [9].

A further important factor playing role in the higher risk for COVID-19 of the elderly is the significant changes of the immune system.

CHANGES OF THE IMMUNE SYSTEM OF THE ELDERLY

Immune system itself is going through profound changes as time passes. Immunosenescence means that the immune system is getting old. The functional capacity of both cellular and humoral immune response is impaired in the elderly. The presence of low inflammatory status called "inflammaging," and a higher amount of circulating pro-inflammatory cytokines is characteristic. Inflammaging should play a key role in the pathogenic process leading to "cytokine storm" that cause serious organ damage. Though the antibody production after vaccination is also weakened, vaccination is strongly recommended for older people [10].

Natural killer (NK) cells are important participants of the innate immune system. In addition to directly lysing the infected cell, NK cells are able to activate and mobilize other immune cells. They are also playing a pivotal role in limiting viral infection [11]. Aging associated changes in NK cell count, phenotype, and functions may have a direct impact on COVID-19 disease progression [10]. NK cell number is reduced in COVID-19 patients. It is more pronounced in case of severe infection [12].

Taking together, changes in innate immune responses and the failure to trigger an effective acquired immune response, and also a higher pro-inflammatory state are responsible for the reduced recovery after infection [3].

CLINICAL PRESENTATION OF COVID-19 IN THE ELDERLY

Presentation of diseases differs in case of the elderly. Usually the clinical symptoms are not so pronounced, specific symptoms of diseases are often missing. Asymptomatic, or paucisymptomatic (only few clinical signs) disease manifestation is also frequent. Diagnosis of diseases is therefore more difficult in the elderly [13].

Identifying patients early in the disease process is important to isolate the patient on time and to prevent the spread of the infection and also to providing appropriate medical interventions. Delay of early diagnosis makes harder to start treatment on time.

To diagnose COVID-19 infection in an older patient may be difficult because of the lack of the typical symptoms [14]. The most common clinical symptoms of COVID-19 in the elderly include fatigue, myalgia headache and digestive symptoms such as vomiting or

anorexia [15]. Because in older adults, normal body temperatures can be lower than in younger adults, fever temperatures can also be lower. Often, the only sign of the disease is a slight alteration of the mental status of a patient with an otherwise normal mental health [16]. This can also lead to a higher transmission rate among people living in nursing homes.

The above-mentioned HOPE-COVID-19 project revealed that patients aged more than 65 years, at the time of hospital admission, more frequently presented symptoms and signs of severe pulmonary involvement such as severe dyspnea, tachypnea, and low peripheral oxygen saturation than patients <65 years. This refers to a more advanced disease state of older patients at the time of hospitalization [5].

DETECTION OF SARS-COV-2 INFECTION

For preventing the transmission of the disease by asymptomatic patients, high intensity of screening for the presence of the virus is required.

There are two methods for detecting acute virus infection.

RNA of the virus can be detected from the nasal or the oral mucosa by means of reverse transcriptase polymerase chain reaction (RT-PCR). Another appropriate, though less sensitive method is to show out the virus spike-protein antigen by using a rapid test. The required test sample is also a nasopharyngeal, nasal, or throat swab.

A previous infection can be proven by the help of detecting antibodies against spike-protein of the virus in the sera.

TYPICAL LABORATORY FINDINGS

Lymphopenia is a common abnormality in patients with SARS-CoV-2 infection, occurring in 32.5–75.4% of COVID-19 patients, indeed, nearly in one third of the geriatric population could leukopenia and lymphopenia be detected [17].

Increased D-dimer, elevated level of LDH and CRP, and decreased albumin level are also typical findings in COVID-19 patients, these alterations can also be observed among the older COVID-patients [18].

OPHTHALMIC SYMPTOMS AMONG ELDERLY PATIENTS WITH COVID-19 INFECTION

The specificity of eye symptoms is still controversial in the literature. Some authors report frequent conjunctivitis during the outbreak in an elderly home, others conclude that conjunctival symptoms are rare during the acute phase of COVID-19 infection and non-specific. The main point is, that the route of infection might be thought the conjunctiva and with the tear COVID virus may get access to the oral mucosa and pharynx and toward the lung. Therefore, the personnel at the emergency unit and intensive care units should protect their eyes as well as wearing a face mask.

Subconjunctival and haemorrhagic hemorrhage were also reported [19]. Usually conjunctival swab is less frequently positive as nasal PCR. So for testing the nasal swab still to be used routinely.

Hyperemic eyelids, scleritis, episcleritis [20] might also be observed occasionally. Ocular discharge, tearing, dryness of ocular surface with consequent visual deterioration, foreign body sensation, burning, itching, photophobia, ciliary injection, eyelid swelling, crusted eyelashes, chemosis [21], follicular conjunctivitis might be present as well [22]. Regarding more severe vision deterioration, central artery occlusion [23], central vein occlusion [24], anterior ischemic optic neuropathy (*Adie pupil*) [11], acute retinal necrosis was also reported, especially in elderly and somewhat immunocompromised patients, mucormycosis is a life-threatening infection [16]. During neuro-ophthalmological assessment optic neuritis, papillophlebitis, Miller-Fischer syndrome [25] were also infrequently observed among elderly patients.

Among very ill patients who need artificial ventilation, the supine (lying) position might increase the intraocular pressure up till 40 mmHg without having any history of glaucoma before. If it lasts long, this might endanger the vision, compressing the axons of the ganglion cells and the lamina cribrosa area around the optic nerve head, which might cause visual filed defects and permanent vision loss in the long run.

SPECIAL THERAPEUTIC AND NURSING CONSIDERATIONS OF THE ELDERLY DURING HOSPITALIZATION DUE TO COVID INFECTION

Because of the more common frailty syndrome and immobility of hospitalized older patients and also due to the COVID-associated elevated thrombotic risk, observation of patients towards to both arterial and venous thrombosis should be kept in mind. Using thromboprophylaxis is strongly recommended for moderate-severe COVID-patients [26]. Co-morbid diseases including congestive heart failure, cancer, and diabetes make the risk of thrombosis even higher [27].

Patients with lower oxygen saturation require oxygen supplementation. In case of respiratory failure treatment in intensive care unit is recommended.

Standard medication for the elderly include corticosteroids, low molecular weight heparin. In case of severe disease (for those who require oxygen supplementation) remdesivir is advised [28]. Observation of patients towards to gastric ulcer, hypertension, or elevated blood glucose level is important in case of elderly, especially if corticosteroids are given together with anticoagulants [29]. Remdesivir may cause elevation of transaminase levels, so a regular checking of liver function is required. It is also contraindicated for patients with an impaired renal function [30].

Use of chloroquine or hydroxychloroquine and/or azithromycin for the treatment of COVID-19 in hospitalized patients is no longer recommended [31].

Nutrition, vitamin and electrolyte support is extremely important. There is insufficient evidence to determine the efficacy of vitamin D in treatment of COVID-19. The rationale for using vitamin D is based largely on its immunomodulatory effect. Ongoing trials are evaluating the place of vitamin D in COVID-19 treatment [28].

Calorie and protein delivery should be carefully calculated. Severe patients have higher energy and protein demand and their recovery is much faster with the help of a professional

nutritionist [32]. We also have to take care for the presentation of the meals for patients with impaired smelling and tasting, and without an appetite. The frequent occurrence of depression also contributes to the feeding problems. Nutrition interventions also include measures to ease chewing and swallowing difficulties such as mechanically altering the consistency of food and/or liquids. Bedridden and invalid patients need help in eating.

Physiotherapy including breathing therapy is especially important for the elderly, for prevention of a rapid breakdown of the musculature and for the preservation of the mobility level of the patient [33].

PSYCHOLOGICAL IMPACT OF COVID-ERA ON THE ELDERLY

Because of the high risk of severe disease and bad outcome, older people were overprotected in the first two or three waves of COVID-19. That means that elderly was not allowed to go out, with the password: “stay home”. Shopping was carried out by the help of relatives, caregivers or home delivery. Old people were isolated, the frequency of depression and anxiety was increased. Physical activity was also reduced, development of sarcopenia and frailty fastened. The under-stimulated environment contributed to a more intense decline of the cognitive function.

Isolation of inpatients was also a great challenge for the elderly. On COVID-departments nurses wore masks and they could not communicate properly with the older patients. Hearing and visual problems of the old patients made their communication even more difficult. Difficulty of using mobile phones, or tablets and the prohibition of admittance of visitors further made their circumstances troublesome [34].

PREVENTIVE MEASURES

The most important measure of prevention for older adults – as well as for those with younger ages – is vaccination. Health Care management should emphasize the significance and promote the availability of vaccination. Older adults, and those who live with, visit or provide care for them, need to take preventive measures to protect themselves from getting COVID-19. Among them keeping a social distance, frequent disinfection of hands and wearing an appropriate mask is the most important. In nursing homes, where staff represents substantial transmission risk, serial universal testing of residents and staff has crucial role [4].

There are limited data concerning the effectiveness of the different COVID-vaccines. Several types of vaccines exist against SARS-CoV2, such as inactivated virus, recombinant proteins, vectored vaccines and also mRNA based vaccines. Because of the rapid process of development of vaccines and limited follow-up period, there is a great public concern about the safety profile of COVID-19 vaccines. According to a meta-analysis, the rate of the most common local symptoms was significantly lower among older adults compared to the younger patients. Adverse events were more frequent in females and subjects with a history of SARS-CoV-2 infection, and decreased with age. In general, it can be stated, that adverse reactions after the most widely used vaccines were relatively benign in the elderly [35].

There are no exact evidences about the efficacy of either COVID-19 vaccine due to the very differing population samples according to size, vaccination regime, pandemic policy of the

country. People 65 and older who received both doses of either Pfizer or Moderna vaccines showed a 94% reduced risk of COVID-19 related hospitalization. As neutralizing antibody titres are declining with time, a third dose is thought to be useful for inducing a boost in humoral response for patients, mainly in case of immunodeficiency and older age [36].

Though we have no reliable data about the rate of unvaccinated persons among the victims of the fourth wave, it can be stated that the vast majority of the hospitalized patients and also those who die because of COVID-19 infection are unvaccinated.

Therefore, in spite of evidence-based results about the efficacy and safety of the different vaccines in geriatric patients, vaccination of the elderly is strongly recommended.

Competing interests: The authors declare that they have no competing interests.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

ABBREVIATIONS

CFR	Case fatality rate
COVID-19	coronavirus disease 2019
NK	Natural killer
RT-PCR	reverse transcriptase polymerase chain reaction
SARS-CoV-2	severe acute respiratory syndrome coronavirus-2

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