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Original article

MORBIDITY AND MORTALITY FROM COVID-19 IN A DIALYSIS CENTER IN NORTHERN BULGARIA

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ABSTRACT

Purpose: Since its inception in early 2020, COVID-19 has quickly become a pandemic, killing more than six million people worldwide. The aim of this study is to investigate the morbidity and mortality of COVID-19 in one Bulgarian hemodialysis center.

Materials and methods: The study is retrospective, conducted for the period of 25th Apr 2020 – 31st Dec 2021. The mean annual number of hemodialysis patients was 184, including patients with end-stage renal disease and acute renal failure. The total number of patients with COVID-19 was 78 (42%), 49of which (63%) were males, the average age was 60 years (+/-12.1 years).

Results: There was no significant difference between the mean age of patients divided by sex (p=0.069). A total of 33 people died (42%), 17 of whom (51%) were males. The average age of the deceased patients (64.24 +/- 10.846) was higher than that of the survivors (58.44 +/-12.286), and the difference was significant (p=0.034). There was no significant difference in the mean age of survived and deceased males (p=0.74) but for females, the difference was statistically significant – the mean age of survivorswas 55.00 (+/-12.03)and of the deceased patients was 67.6 (+/-8.79) years.

Conclusion: Our results confirm data from similar studies aboutthe high incidence and mortality of COVID-19 in hemodialysis patients. We confirma statistically significant increase in mortality of these patients with increasing age. Probably the mass vaccination of patients and staff; the use of antiviral drugs and biological therapy is the way to reduce morbidity and mortality among them.

Keywords: end-stage renal disease, hemodialysis, COVID-19 - morbidity and mortality,

INTRODUCTION

End-stage renal disease (ESRD) correlates with significantly increased morbidity and mortality mainly due to infections and cardiovascular disease (CVD), which account for respectively 20% and 50% of the total mortality causes in these patients. These two complications are considered to be related to immune dysfunction characteristic of patients with ESRD [1].

Coronaviruses are RNA viruses responsible for various diseases in birds and mammals [2]. They are the largest group in the order Nidovirales, which also includes the families Arteriviridae, Mesoniviridae and Roniviridae. Structurally, coronaviruses are characterized by an unusually large RNA genome and glycoprotein spikes that protrude from the surface of its envelope [3]. These spikes lead to a characteristic appearance resembling the solar corona, whence their name – "coronavirus" [2, 4].

Although identified as early as 1965, human coronaviruses (HCoVs) have recently gained notoriety for their role in several epidemics [5, 6]. Although most strains of Coronaviride lead to mild, self-limiting upper respiratory tract disease in humans, three global outbreaks of a severe condition have been reported in the twenty-first century to date due to new mutations. Severe Acute Respiratory Syndrome (SARS) was first identified in Guangdong Province, China, in 2002, and caused more than 8,000 cases and 744 deaths worldwide before limiting itself in 2003. Middle Eastern Respiratory Syndrome (MERS) was diagnosed in Saudi Arabia in 2012, spread rapidly worldwide, and resulted in 2,494 clinically manifested and 858 deaths [7]. Most recently, SARS-CoV-2, the new coronavirus responsible for coronavirus disease 2019 (COVID-19), was identified in Wuhan, China, in January 2020 [(8]. According to statistics on the website www.worldometers.info [9], the number of deaths from this disease worldwide, as of 31st Dec 2021 is 5 455 872 people. The aim of this study is to investigate and present the morbidity and mortality of COVID-19 in one Bulgarian hemodialysis center.

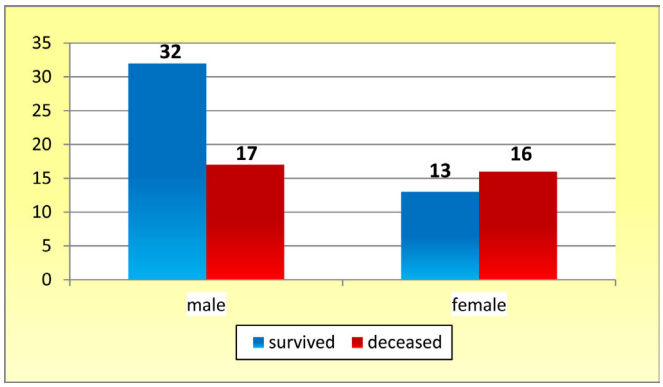
MATERIALS AND METHODS

The study is retrospective, conducted for the period of 25th Apr 2020 – 31st Dec 2021 (twenty months). The average annual number of patients receiving hemodialysis treatment was 184, including patients with terminal and acute renal failure. All of patients were tested for COVID-19. A reverse transcription polymerase chain reaction (RTPCR) test was performed from a nasopharyngeal swab to detect COVID-19. The positive result was accepted as evidence of severe acute coronavirus 2 syndrome (SARS-CoV-2).

RESULTS

The total number of patients with COVID-19 was 78 (42% of all hemodialysis patients), 49 of which (63%) were males. The average age of the patients with COVID-19 was 60 years (+/-12.1 years).There is no significant difference between the mean age of patients by sex (p = 0.069). A total of 33 people died (42%), 17 of whom (51%) were males (Figure 1).

Fig. 1. Distribution of the survivedand the dead patients by sex.



We found that the average age of the deceased patients (64.24 +/- 10.846) is significantlyhigher than the age of the survivors (58.44 +/- 12.286) (p = 0.034). There is no significant difference in the mean age of survived and deceased males (p = 0.74). However, the mean age of the female survivors was 55.00 (+/- 12.03) years, while that of the deceased ones was 67.6 (+/-8.79), and this age difference was significant (p = 0.003). We did not find a significantassociation of the outcome of the diseasewith comorbidities – heart failure, overweight, diabetes mellitus (p = 0.061), as well as with the type of vascular access used (p = 0.084).

DISCUSSION

Ng JH, et al. (2020) reported significantly higher mortality (31.7% vs. 25.4%) in patients with ESRD in New York and also found a significant difference associated with the older age of deceased patients. They also found that impaired renal function was an independent risk factor for adverse disease outcome [10].

Scarpioni R, et al. (2020) reported a morbidity rate of 16% in their hemodialysis patients, but reported a mortality rate of 41% compared to the Italian average of 10% for this period, despite their additional treatment methods such as high-flow haemofiltration (6 L/hr) and absorbent membranes to remove inflammatory cytokines (IL-6) and endotoxins from the circulation [11].

Turgutalp K, et al. (2021) found mortality in 16.3% of their hemodialysis patients, and a correlation between patient mortality and other characteristics like: old age, severe critical illness at the time of diagnosis, presence of congestive heart failure, high ferritin levels on admission, AST elevation (> 2x upper limit of normal) and thrombocytopenia ($<150 \times 10^9$/ L) during hospitalization [12]. Their medications include: chloroquine/hydroxychloroquine (96.6%), macrolides (78.7%), oseltamivir (60.7%), favipiravir (32.4%), glucocorticoids (4%), lopinavirritonavir (1.8%), tocilizumab (1.5%), anakinra (0.9%), convalescent plasma (0.4%).

Most of the morbidity and mortality studies in hemodialysis patients were performed in relation to their admission to emergency centers and were compared with other patients with SARS-CoV-2. Goicoechea M, et al. (2020) followed their patients in a dialysis center in Spain for a period of one month – 36 patients. Half of them developed the severe disease, 61% died [13].

CONCLUSION

The results from our study confirm findings from other authors that the morbidity and mortality of patients undergoing hemodialysis are significantly higher than in the general population during the COVID-19 pandemic. We share the view that this is mainly caused by three factors: higher average age, compromised immunity and multiple comorbidities in hemodialysis patients. We can only theorize at this stage that increased vaccination activity and the use of specific antiviral drugs would reduce both morbidity and adverse outcomes in these patients.

LIMITS

Our study did not trace the relationship between laboratory and clinical changes at the time of hospitalization and its outcome.

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