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THE PREVALENCE OF CARDIOVASCULAR COMORBIDITIES IN COVID-19 HOSPITALIZED PATIENTS

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ABSTRACT

Background: COVID-19 infection, or infection caused by coronavirus, has reached millions of cases worldwide and is currently a global health and socioeconomic problem. The range of clinical presentation of COVID-19 infection is very wide. The spectrum of respiratory symptoms is dominant in productive symptomatology. The severity of the clinical presentation as well as the prognosis of the disease depends on the associated comorbidities. Cardiovascular comorbidities have been shown to be the most significant and most frequent ones. **Methods:** The research was designed as an observational, retrospective study. The observed sample consisted of consecutive, hospitalized patients at the Infectious Diseases Clinic, at the University Clinical Center of the Republic of Srpska, from the 1st March to 15th August, 2020 with proven COVID-19 infection (positive real time PCR test). In this study we used clinical and epidemiological datas from 265 Discharge Letters archived in the Clinical Information System. **Results:** The mean age of patients with COVID-19 was 54.99 years, with a predominance of males (61.88%). The most common cardiovascular comorbidity was hypertension with a prevalence of 43% in relation to the total number of hospitalized, and 72.15% in relation to the total number of all cardiovascular comorbidities. Two patients were diagnosed with acute myocardial infarction that ended in death. The second most common

cardiovascular comorbidity was cardiomyopathy - in 23 patients, or 8.68% of the total number of hospitalized. **Conclusion:** Cardiovascular comorbidities were present in almost 2/3 of hospitalized patients. Accordingly, it is very important to consider the prevalence of cardiovascular comorbidities and their effects on the course of the disease in patients with proven COVID-19 infection.

KEYWORDS: cardiovascular comorbidities, coronavirus, COVID-19, hypertension.

INTRODUCTION

Infection caused by the new COVID-19 virus, better known as SARS-CoV-2, began in 2019 in the Chinese province of the Wuhan City. It acquired the status of a global pandemic on March 11th, 2020, by a decision of the WHO.[1] It is a previously known large family of viruses whose number is measured in the hundreds.[2]

This is a highly contagious virus that is transmitted interhuman by droplets and causes Severe Acute Respiratory Syndrome (SARS). The incubation period is variable, but overall the symptoms begin within one week.[3] In humans, corona virus infection can cause a wide range of clinical manifestations, from asymptomatic forms to very severe with a fatal outcome.[4]

Early clinical manifestations, i.e. mild clinical presentation, include the appearance of general weakness, malaise, loss of sense of smell and taste, loss of appetite, nausea and vomiting, diarrhea and mild fever.[5,6] Moderate and severe clinical presentation is dominated by dyspnoea, dry irritant cough, high fever and the development of pneumonia.[7] The severity of the clinical presentations is very unpredictable. In a large number of cases, more severe clinical pictures are mainly manifested in the elderly with associated comorbidities, of which diabetes, cardiovascular diseases, previous respiratory diseases, obesity and underlying comorbidity are particularly significant.[8-11] However, in some cases, patients had severe clinical pictures and / or a fatal outcome without known associated comorbidities. Cases with a proven COVID-19 infection of mild or asymptomatic clinical picture, and with malignant or some other severe disease in the background, have been observed.[12-15]

Among all the associated comorbidities in patients with COVID-19 infection, cardiovascular comorbidities are the most common and significant.[16-19]

The aim of this study was to review the prevalence of cardiovascular comorbidities in hospitalized patients with COVID-19 infection.

METHODS

The research was designed as an observational retrospective study. The observed sample consisted of consecutive hospitalized patients in the Infectious Diseases Clinic at the University Clinical Center of the Republic of Srpska, from the 1st March to 15th August, 2020 with proven COVID-19 infection (positive real time PCR test). The respective local ethics committees approved the research protocol.

Clinical and epidemiological data from 265 Discharge Letters archived in the Clinical Information System were used to prepare this study. The data collection process was performed on an individual analysis of each discharge letter and extraction of the necessary clinical and epidemiological data for this study, which were subsequently documented and analyzed in SPSS. Statistical analysis. Data were presented in at least 95% of the included patients. Categorical variables were presented as numbers and percentages. Continuous variables were expressed as mean with standard deviation or median with interquartile according to the data distribution.

The observed sample did not include patients with a negative real time PCR test, and highly suspected of COVID-19 infection, as well as surgical, gynecological and pediatric patients with proven COVID-19 infection, and patients hospitalized and treated at the Intensive Care Unit.

In addition to the analysis of individual comorbidities in patients, we classified patients into appropriate age groups and analyzed the frequency of certain cardiovascular comorbidities within each of the groups.

RESULTS

Out of 265 hospitalized patients in the Infectious Diseases Clinic, at the University Clinical Center of the Republic of Srpska, 164 of the patients were male, making the 61.88% of the whole group, while 38.12% was female.

The mean age of patients was 54.99 years. Cardiovascular comorbidities were present in 158 patients and 59.62%, respectively. The most common comorbidity was hypertension, in 114 patients, 43% of the total number of hospitalized patients, and 72.15% of all cardiovascular

comorbidities. Data on previous myocardial infarction were obtained from four patients. During hospitalization, two acute fatal myocardial infarction were diagnosed, in a 64-year-old patient without comorbidities, and in an 80-year-old patient with numerous comorbidities.

Cardiomyopathies were present in 23 patients, reaching the percentage of 14.56% in relation to the total number of cardiovascular comorbidities. Cardiac arrhythmias (atrial fibrillation) were previously diagnosed in 14 patients. One patient had valvular heart disease as a comorbidity. (Table 1).

Table 1: The prevalence of cardiovascular comorbidity in COVID-19 patients.

Comorbidity	Number of patients	% of all hospitalised patients	% of all cardivascular comorbidity
HTN	114	43	72,15
MI	6 (2 AIM)	2,26 (0,75)	3,79 (1,26)
CMP	23	8,68	14,56
ARR	14	5,28	8,86
VHD	1	0,37	0,63
Total	158		

In relation to age, all respondents were classified into five age groups (younger than 30 years; 30-45 years; 45-65 years; 65-80 years and older than 80 years). In all age groups, the predominance of males in relation to females was noted, and the largest number of patients was in the group of 45-65 years.

There were 20 patients in the age group younger than 30, and two male patients had hypertension. There were 39 male and 15 female patients in the 30-45 age group. Eight male patients had hypertension, while one 44-year-old patient had cardiomyopathy and arrhythmia as cardiovascular comorbidity. The age group 45-65 years consisted of 114 patients, of which 69 were males, and hypertension was in a total of 47 of them. Out of a total of 58 patients aged 65-80 years, 43 had hypertension as a comorbidity, 10 had cardiomyopathy, and 4 had cardiac arrhythmias. In the age group older than 80 years, there were 19 patients, 11 male and 8 female patients, 14 with hypertension, 8 with cardiomyopathy and 6 with arrhythmia. (Table 2).

Table 2: Distribution of comorbidity in different age groups.

Age Groups	Total patients	Gender		Cardiovascular comorbidity				
		Male	Female	HTN	MI	CMP	ARR	VHD
<30	20	12	8	2	0	0	0	0
30-45	54	39	15	8	0	1	1	0
45-65	114	69	45	47	2(1 acute NSTEMI)	4	3	0
65-80	58	33	25	43	2	10	4	1
80+	19	11	8	14	2 (1 acute NSTEMI)	8	6	0
Total	265	164	101	114	6	23	14	1

Abbreviation: HTN – hypertension; MI – myocardial infarction; CMP – cardiomyopathy; ARR – arrhythmias; VHD – valvular heart disease; NSTEMI – non-ST elevation myocardial infarction.

DISCUSSION

At the University Clinical Center of the Republic of Srpska, from 1st March to 15th August, 2020, a much higher number of infected with COVID-19 was hospitalized compared to our sample, given that we analyzed only patients hospitalized at the Infectious Diseases Clinic with confirmed COVID-19 infection (positive real time PCR), not taking into account those who were highly suspected of COVID-19 and with negative real time PCR as well as surgical, gynecological, pediatric patients and patients treated in the Intensive Care Unit with proven COVID-19 infection. The total number of analyzed patients, i.e. Discharge Letters from patients who met the mentioned criteria is 265.

Regarding the distribution of hospitalized patients in relation to gender, there was a predominance of males in relation to females in relation to 61.88% versus 38.12%, which is in correlation with the results of other researchers.[20-23]

The mean age of patients was 54.99 years, which is slightly higher than in other authors 48.9 years,[21] and 51 years.[24]

Analyzed cardiovascular comorbidities in patients are hypertension, myocardial infarction, cardiomyopathy, arrhythmias and valvular heart disease.

The most common comorbidity is hypertension with a prevalence of 43% in relation to the total number of hospitalized, and 72.15% in relation to the total number of all cardiovascular

comorbidities. The Canadian group of authors[25] analyzed 22,753 patients and observed a prevalence of hypertension of 27.4%, while the Chinese group of authors[21] out of 1,590 hypertensive patients had 16.9%, and 1,053 patients observed by a group of researchers from Iran[24] had hypertension in 21% of patients.

The discrepancy obtained in the results of our study and the results of other researchers on the incidence of hypertension as the dominant cardiovascular comorbidity in COVID-19 positive patients may be due to selective selection of a targeted smaller group of subjects (excluded pediatric population), and average age, geographic location and everyday routines.

The second most common cardiovascular comorbidities were cardiomyopathies with a prevalence of 14.56% of the total number of cardiovascular comorbidities and the highest number of cardiomyopathies was present in patients aged 65 to 80 years, in 10 patients. Four patients had history of previous myocardial infarction, while 2 patients were diagnosed with acute NSTEMI during hospitalization. Both patients were male, aged 64 and 80 years. The 64 year old patient did not have comorbidities, while the 80-year-old patient had numerous comorbidities. Both patients had bilateral pneumonia caused by COVID-19 infection.

In 14 patients, i.e. 8.86% of all cardiovascular comorbidities, arrhythmias occurred. Patients older than 80 years had the highest number of arrhythmias, which correlates with the results of other researchers.[25]

Valvular heart disease was present in one patient accounting for 0.63% of total comorbidities. In relation to age, all respondents were classified into five age groups (younger than 30 years; 30-45 years; 45-65 years; 65-80 years and older than 80 years). In all age groups, the predominance of males in relation to females was noted, and the largest number of patients was in the group of 45-65 years, 114 or 43.02%. In all age groups, the most common comorbidity was hypertension. (Table 2).

The mentioned individual results on the frequency of hypertension as the most common comorbidity within age groups are correlated with the results of other researchers, noting that the total number of comorbidities is statistically higher compared to other researchers, as previously mentioned.[22-25]

CONCLUSION

Despite the fact that COVID-19 is still unknown around the world, there is growing evidence to support a more severe clinical form of the disease in patients with comorbidities. Cardiovascular diseases, as one of the most common diseases in the world, are also very common among COVID-19 positive patients. Considering the situation in our health institution, we came to the data that cardiovascular comorbidities were present in almost 2/3 of patients, of which the predominant group of hypertensives is middle-aged and elderly, which is an unavoidable factor in assessing the clinical condition and final outcome of COVID-19 infection.

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CONFLICT OF INTEREST

None.

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