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CORRELATIONS BETWEEN COVID 19 SYMPTOMS AND RISK OF PULMONARY EMBOLISM

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ABSTRACT

The World Health Organization (WHO) declares COVID 19 pandemic in March 2020. Each pandemic wave had different clinical and biological characteristics, the expression of the disease being correlated with the dominant viral variant. Patients with COVID 19 have a pro-coagulant status, which predisposes them to thromboembolic complications.

The current study aims to systematize the symptoms of COVID 19 and to highlight its relationship with the suspicion and confirmation of the diagnosis of pulmonary thromboembolism.

We performed a descriptive retrospective study on patients with COVID 19 for a period of 4 months (September-December 2021). During this period, 183 were hospitalized with COVID 19 and 53 were enrolled in the study. Incidence of COVID 19 was 63% (33) in men and 37% for women. The average age of women was 68 years compared to men where the average age was 61 years. We observed a higher incidence of the disease in men in the 41-60 age group (39% of all men), while, in women, the most affected age group was 61-80 years (60% of all women). Pulmonary thromboembolism (PE) was diagnosed by pulmonary artery angiography, with an incidence of 57% in the study group affecting 60% of women and 55% of men.

The symptoms are dominated by fever, cough and dyspnea. Fever was present in 65% of women and 55% of men, cough was present in 65% of women and 79% of men, while dyspnea involved 40% of women and 42% of men.

In conclusion, PE was a common complication in COVID patients that contributed to adverse outcome and higher mortality. The symptoms were not specific to minor forms of the disease.

Keywords: COVID 19, symptoms, pulmonary thromboembolism

Introduction

In January 2020, the World Health Organization (WHO) assessed the outbreak of coronavirus discovered in Wuhan, China, as an emergency of global health interest. In February of the same year, WHO recognized the pandemic potential of this virus, and in March 2020, COVID 19 was declared a pandemic (1). Etymologically, the coronavirus was named after the latin "corona", a word that describes the viral surface characterized by the electron microscope (2). Coronaviruses are RNA viruses belonging to the Order Nidovirales, family Coronaviridae, subfamily Coronavirinae (3).

Current data on RNA viruses, such as coronavirus, influenza virus and HIV admit that they have extremely high mutation rates due to their replication mechanism and lack of RNA correction activity of viral polymerase (4). Viral mutations help the characteristics of the virus itself and allow its evolution, through increased virulence and high adaptability to the environment (5).

Each pandemic wave had different clinical-biological characteristics, the expression of

the disease being closely correlated with the dominant viral variant at that time (6-8).

The symptoms of COVID-19 are similar to those of other known types of viral pneumonia, with varying degrees of severity. Clinical manifestations of the cases include fever, cough, dyspnea, chills and fatigue (9). Patients with COVID 19 have a pro-coagulant status, objectified by biochemical determinations of d-dimers, which predisposes to thromboembolic complications (pulmonary thromboembolism, most common), with an increased risk of complications and poor prognosis (10–14).

The study aims is to systematize the symptoms of COVID 19 and highlight its relationship with the suspicion and confirmation of the diagnosis of pulmonary thromboembolism, given the high financial costs and unavailability of performing pulmonary artery angiography for all patients with COVID 19.

Material and method

We performed a descriptive retrospective study on patients with COVID 19 for a period of 4 months (September-December 2021) admitted to the Clinical Hospital of Pneumophthisiology Constanta, when Romania was facing the 4th pandemic wave with the Delta variant. During this period, 183 patients with the diagnosis of SARS Cov2 infection were hospitalized and 53 patients were enrolled in the study. Patients' medical records and medical records were investigated.

The inclusion criteria in the study were: SARS CoV2 positive RT-PCR test, Angio-CT pulmonary arteries performed. Exclusion criteria: lack of pulmonary artery Angio-CT and lack of complete medical information from patients' progress sheets. Several parameters were taken into account: age, sex, form of the disease, symptoms, hospitalization diagnosis, comorbidities, discharge status.

The forms of the disease were classified according to the aspect of computed tomography as follows: mild form (1-10 points), moderate form (11-17 points), moderate-severe form (18-20 points), severe form (> 21 points) (15-16).

The data obtained were included in tables and graphs, using simple statistical processing. Descriptive statistical analysis was performed using Microsoft Excel.

Results

All 53 patients included in the study were confirmed with COVID 19 by SARS CoV2 RT-PCR. Descriptive statistical analysis showed a higher incidence of COVID 19 in 63% of men (33), while 37% of women were affected (20).

Table 1 Caracteristics of the patients

	Study group (n,%) N 53	COVID 19 with PE (n,%) N 30	COVID 19 without PE (n,%) N 23
Women	20(37%)	12(60%)	8(40%)
Men	33(63%)	18(55%)	15(45%)
Smokers	13(24,5%)	6(20%)	7(35%)
Non-smokers	40(75,5%)	24(80%)	16(65%)
Symptoms			
-fever	31(58%)	22(73%)	14(61%)
-frisson	38(72%)	22(73%)	16(70%)
-cough	39(74%)	19(63%)	20(87%)
-dyspnea	22(42%)	16(53%)	8(35%)
-dizziness	7(13%)	4(13%)	3(13%)
-thoracic pain	6(11%)	3(10)	3(13%)
-headache	13(25%)	9(30%)	4(17%)
-loss of smell	10(19%)	7(23%)	3(13%)
-sweating	12(23%)	6(20%)	6(26%)
-physical asthenia	21(40%)	10(33%)	11(48%)
Comorbidities			
-Hypertension	35(66%)	19(63%)	16(70%)
-Diabetes	25(47%)	18(60%)	7(30%)
-Obesity	13(25%)	7(23%)	6(26%)
-COPD	13(25%)	7(23%)	6(26%)
-Asthma	4(8%)	4(13%)	0(0%)
-Pulmonary tuberculosis	2(4%)	2(7%)	0(0%)
Form of disease			
-light	3(6%)	3(10%)	0(0%)
-moderate	12(23%)	5(17%)	7(30%)
-moderate-severe	11(21%)	10(33%)	1(4%)
-severe	27(51%)	12(40%)	15(66%)
Evoution			
Cured	43	24	19
Deaths	10	6	4

In terms of age, we divided the study group into 4 categories: 20-40 years, 41-60 years, 61-80 years and over 81 years. The average age of women was 68 years compared to men where the average age was 61 years. We observed a higher incidence of the disease in men in the 41-60 age group (39% of all men), and in women the age

group most affected was 61-80 years (60% of all women).

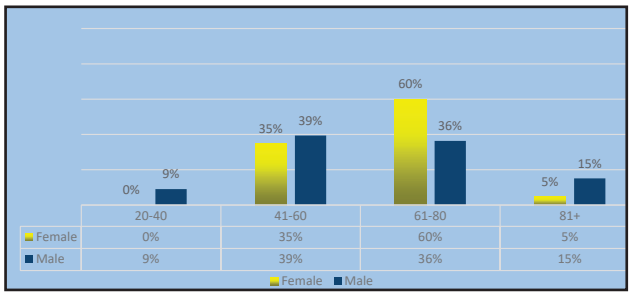


Figure 1. Distribution by age groups

The 3 most common extrapulmonary comorbidities in the study group were Essential Hypertension (HTAE), Type II Diabetes and Obesity distributed as follows: HTAE 75% of women, 61% of men, type II diabetes 50% of women, 45% of men and Obesity was found in 81% of women and 21% of men.

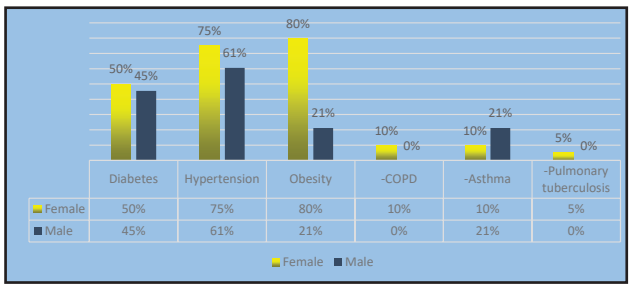


Figure 2. Distribution of comorbidities female vs. male

Pulmonary comorbidities are obstructive pulmonary disease and secondary pulmonary tuberculosis. 5% of women were diagnosed with pulmonary tuberculosis. We found an incidence of asthma in 10% of women, while known patients with COPD were predominantly 21% men.

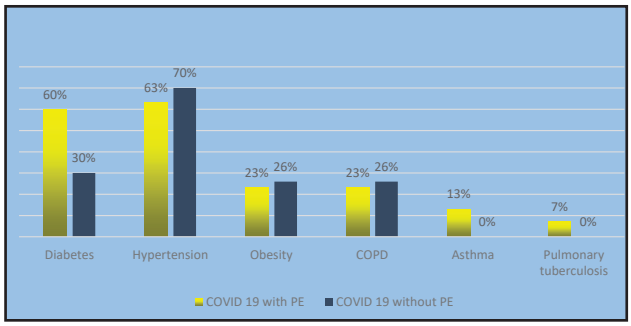


Figure 3. Distribution of comorbidities in patients with COVID 19 with PE vs. COVID 19 without PE

The forms of the disease were divided into 4 categories considering the lung damage detected on the computed tomography of the lung. The incidence of the severe form of the disease was approximately equal in women and men (50% vs. 52%), being the most common form followed by moderate and moderately severe impairment.

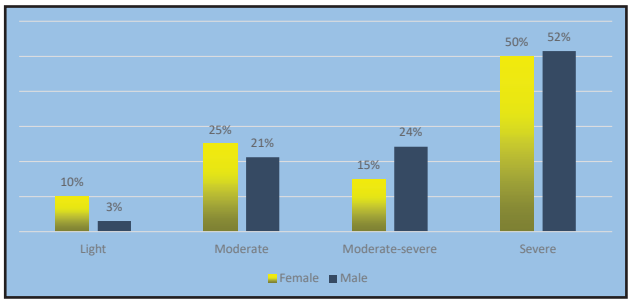


Figure 4. Distribution of COVID 19 forms Female vs. Male

Pulmonary thromboembolism was diagnosed by angiography of pulmonary arteries, the incidence being 57% in the studied group (n = 30) affecting 60% of women (n = 12) and 55% of men (n = 18).

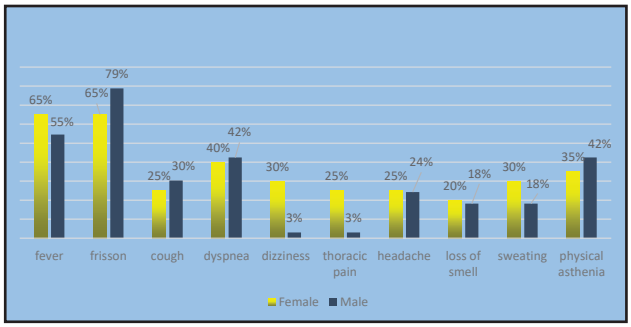


Figure 5. Distribution of symptoms Female vs. Male %

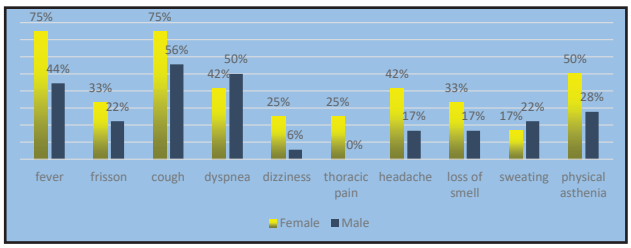


Figure 6. Distribution of symptoms - patients with COVID 19 and PE

The symptoms are dominated by fever, cough and dyspnea. Fever was present in 65% of women and 55% of men, cough was present in 65% of women and 79% of men, while dyspnea

involved 40% of women and 42% of men.

In patients diagnosed with PE we found a predominance of frisson, affecting 75% of women and 56% of men, followed by fever (75% of women, 44% men) and dyspnea (42% of women, 50% men), but also a decrease in the presence of cough in patients. In the group of patients with COVID 19 and PE, 6 patients died simultaneously and in the group of patients COVID 19 without PE, 4 patients died, finding a higher overall mortality among male patients (24%).

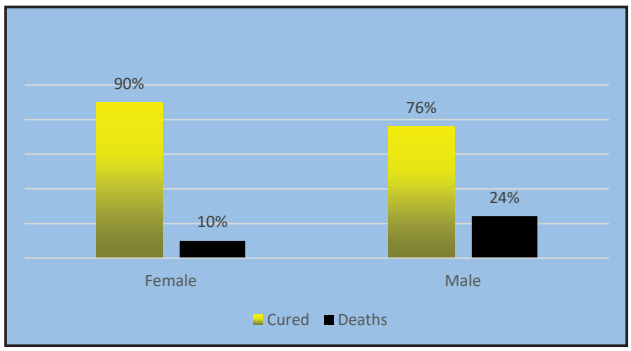


Figure 7. Outpatient Status Female vs. male

Discussions

Our experience with this group of patients confirms that, in the Dobrogea region, the symptoms of patients with COVID 19 but also of those who associated PET was similar to the data in the literature. Most studies and meta-analyzes have been conducted in Asia, countries such as China and India, and in Europe in Spain. This is due to the large number of patients that the health systems in these countries have faced in the period 2020-2021.

Oscar Miro et al., in the presented demographics, showed that the average age of the patients was 66 years and the incidence of PET in COVID 19 male patients was 58.4%.

Zhongliang Wang et al., In a study in Wuhan, China, described the frequency of comorbidities in patients with COVID 19 as follows: HTAE 13%, Type II diabetes 10%, COPD 6%, Asthma 3%. Oscar Miro et al., In his study conducted in Spain, it is shown that the comorbidities of patients with COVID 19 were as follows: HTAE 49.2%, Diabetes 17.9%, COPD 6.8%, Asthma 8.2% Obesity 36.1% . We therefore observe a high presence of comorbidities in our study group compared to the data presented previously, which had a negative influence on the symptoms and evolution of patients.

Symptomatology described by Oscar Miro et all. in patients with COVID 19 and PE, includes: dyspnea (71.5% of cases), cough (47.8% of cases), fever (44.8% of cases), chest pain (30.2% of cases) compared with our study group where fever and frissons are the most commonly reported symptoms of patients, followed by dyspnea, marked physical asthenia and cough. In the group of patients studied, the symptoms were nonspecific to raise the suspicion of PE, dyspnea being present in 50% of patients. Usually PE was minor, at the level of the subsegmental bronchi. According to the four-wave Covid treatment guide, all patients received at least one prophylactic anticoagulant treatment. The risk of PE has been suspected especially in the high values of d-dimers, although the specificity of the method is relatively low, considering a threshold value over 600 DDU, about 59% (17-18).

It is noted that pulmonary thromboembolism did not correlate the severity of the disease, this can be explained by the inclusion in the study of patients who had only computed tomography

Some limitations of the study I conducted should be mentioned. For example, all patients included in this study were inpatients and our group size was relatively small. We did not collect or analyze data from outpatients with mild symptoms or from suspected patients under observation at home and awaiting a definitive diagnosis. This study is part of a larger research.

Conclusions

In conclusion, PE was a common complication in COVID 19 patients (the mechanisms involved being: a hypercoagulable condition responsible for large vessel thrombosis and direct vascular and endothelial lesions responsible for in situ microvascular thrombosis (19-20) which contributed to unfavorable evolution and higher mortality. The symptoms were not specific to minor forms of the disease. In patients with COVID 19 it is essential to diagnose this complication and apply appropriate treatment.

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