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Clinical Presentation and Biological Modification of Hospitalized Patients for COVID-19 in the Democratic Republic of Congo

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Abstract: *Background and aims:* the whole of humanity has experienced since December 2019 a pandemic of coronavirus disease 2019 (COVID-19), caused by the coronavirus. Unprecedented situation in this century especially for the DR Congo with a less equipped health system. The objective of this study is to describe the clinico-biological profile of patients hospitalized at the Cinquantenaire Hospital of Kinshasa in DR Congo. *Methods:* This was a retrospective, analytical and descriptive cohort study carried out among 360 patients hospitalized at the Cinquantenaire Hospital in Kinshasa from the period from April 18, 2020 to July 10, 2021. *Results:* The average age was 42.7 ± 12.0 years with a female predominance, 57.7% of patients were over 50 years old. Comorbidities such as hypertension, diabetes mellitus and bronchial asthma were present respectively in 25.2% and 4.2% and 12.3%. The symptomatology was dominated by cough, fever and asthenia in more than The most common biological abnormalities were as follows: increased CRP (57.7%), basocytaemia (55%), hepatic cytolysis (20.6%), elevated D-dimer (15.3%), decreased TP (17.5%) lymphopenia (16.7%), anemia (11.1%) and Hyperleukocytosis 10.6% *Conclusion:* COVID-19 infection should be considered as sepsis with multi-visceral involvement although the lung is first. Both biological and hematological abnormalities may be encountered.

Keywords: COVID-19, Symptoms, Biology

1. Introduction

In December 2019, an epidemic linked to Coronavirus 2 (SARS-CoV-2) appeared in the city of Wuhan in China, responsible for a picture of acute respiratory distress [1]. This epidemic quickly spread across the world and was declared a pandemic on March 11, 2020 by the World Health Organization (WHO) in March 2020. [2]. From its onset until January 2021, 103,377,424 people were infected, of which 57,272,203 cured (55.4%) and 2,236,454 died (2.2%) [3]. Although COVID-19 has an overall death rate of around 2% to 3%, the case fatality rate is higher especially in the elderly [4]. In sub-Saharan Africa (SSA), the number of infected people remains low and especially a very low mortality compared to

other regions of the world [5]. Two major reasons could explain this observation: a young population and a possible cross-immunity between SARS-Cov-2 and other infectious agents very common in the region. Due to the low socio-economic level of its population, preventive measures against COVID-19, in particular social distancing and the compulsory wearing of masks, have never been respected [6]. The diagnosis is made on the basis of elements including the notion of contact with a suspected/confirmed case of COVID-19, the results of virological samples and the suggestive clinical signs [7-9]. The main signs are fever, cough, myalgia, asthenia, dyspnea, headache, odynophagia, loss of taste and smell and gastrointestinal signs [10-12]. The main symptoms are fever, cough, myalgia, asthenia, dyspnea, headache, odynophagia and gastrointestinal signs. Clinical variations have been observed in several countries around the world [13].

Symptoms for most patients overlap with other acute lower respiratory tract infections.

During COVID-19, the frequencies of biological abnormalities are also very variable from one study to another [12]. We note not only elevations of C-reactive protein (CRP), transaminases [alanine and aspartate amino-transferase (ALAT, ASAT, respectively)] and lactic dehydrogenase (LDH) [12] but also, anemia, thrombocytopenia and acute renal failure appeared infrequent [12].

In the Democratic Republic of Congo (DRC), since the announcement of the first case of COVID-19 in March 2020, 22,322 other patients have been reported including 14,997 (67.8%) recovered and 665 (3%) deaths. If the factors associated with mortality have already described [14], it is not yet for the clinical manifestations and biological changes during COVID-19.

2. Methods

This was a retrospective cohort covering the period from April 18 to October 15, 2020, conducted at the Cinquantenaire hospital in Kinshasa. The hospitalized patients were divided into three groups, the suspect, the confirmed and those admitted to intensive care. The study was carried out in accordance with the principles of the Declaration of Helsinki and patient data was depersonalized. The target population was patients hospitalized during the study period with a clinical picture suggestive of COVID-19. Only patients with a positive diagnosis of COVID-19 confirmed by serology (IgM, IgG) and/or by RT-PCR (Reverse transcription polymerase chain reaction) and chest CT compatible with the infection were included in the study. RT-PCR test and serological tests for COVID-19 infection: nasopharyngeal swabs were taken on admission to the services dedicated to the care of patients suspected of COVID-19. The detection of the genomic material of the coronavirus was carried out at the level of the INRB laboratory. The serological test for COVID-19 infection allows qualitative detection of Ig G and/or Ig M in serum was carried out by the laboratory of the fiftieth anniversary hospital. Clinical data were collected in the files of hospitalized patients, they were mainly: the main complaints on admission, age (year), sex, smoking, and alcoholism, medical history of patients (arterial hypertension (hypertension), diabetes mellitus (DS), heart disease, and asthma Biological data, a blood sample was taken to determine: blood count (CBC), leukocytes ($103/mm^3$), platelets ($103/mm^3$)], CRP (mg/L), first hour sedimentation rate (VS, mm), renal function (urea (g/l), creatinine (mg/l)), hepatic function (transaminases (IU/L), blood ionogram (serum potassium (mmol/l)) and prothrombin level (PT) Analyzes were carried out according to the usual methods of the biology department of the Cinquantenaire hospital.

2.1. Operational Definition

CRP was considered to be increased if the level was > 5 mg/dl [15].

In patients aged <50 years, ESR > 15 in men or > 20 in women were considered to be increased [16]. The hyper-creatinine level was retained before a value > 14 [17].

Hepatic cytolysis was retained before ALT and/or ASAT values > 50 [18].

The following equations for blood pressure-to-height ratio (BPHR) were used:

Systolic blood pressure-to-height ratio (SBPHR) = SBP (mmHg)/height (cm)

Diastolic blood pressure-to-height ratio (DBPHR) = DBP (mmHg)/height (cm).

The nutritional status was defined according to the specific thresholds of BMI [19], Hyperleukocytosis and leukopenia were defined by a number of leukocytes, respectively, > 10,000 and <4000 [20].

Three groups were defined [leukopenia; leukocytes in norms; hyperleukocytosis. Lymphopenia was retained in front of a number of lymphocytes <1000 [21]. Thrombocytopenia and thrombocytosis were defined in terms of platelet counts, respectively, <150 and> 450 [21]; PT <70% was qualified as decreased [21].

2.2. Statistical Analysis

All analyzes were performed using the SPSS 21 statistical software (SPSS for Windows; SPSS, Inc., Chicago, IL, USA). Numerical variables were reported as the medians and interquartile ranges. Categorical variables were reported as number and percentage. Comparisons were performed between groups using non parametric tests and Pearson Chi-Square tests. TheSpearman coefficient was used to measure the correlation between anthropometric parameters (BFM, NC, WC and HC).

Quantitative and qualitative data were expressed as mean±standard deviation and number (%), respectively.

The p-value <0.05 was considered to be statistically significant.

3. Ethical Consideration

Written informed consents were obtained from all participants. All procedures were in accordance with the Helsinki Declaration of 1975, as revised in 2008.

4. Results

A total of 360 patients were hospitalized during the study period, including 209 females (ie 58.1%) with a female/male sex ratio of 1.4.

The mean age was 42.7±12.0 years with extremes of 30 and 70 years.

More than half of the patients were over 50 and married.

Overweight obesity, diabetes mellitus, arterial hypertension, pulmonary tuberculosis, bronchial asthma and ischemic heart disease were the most reported antecedents with a statistically significant difference in both sexes. (Table 1).

The different levels of systolic blood pressure (SBP), diastolic pressure (PAD), BMI, waist circumference, and heart rate were respectively 137.2±22.9 mmHg, 88.7±15.7 mmHg, 23, 5±4.9 Kg/m², 81.7±11.9 cm and 90.3±10.6 bpm/minute. (Table 1).

Table 1. *General characteristics of the study population.*

Variables	Over All n = 360	Male n=151	Female n=209	P
Age, years	42.7±12.0	47.4±13.4	42.7±14.3	<0.001
Age categories, n (%)				<0.001
< 40 years	72 (20.0)	28 (18.5)	44 (21.1)	
40-49 years	80 (22.2)	27 (17.9)	48 (25.3)	
50-59 years	121 (33.6)	42 (27.8)	81 (38.6)	
≥60 years	87 (24.2)	40 (26.5)	47 (22.5)	
Marital status, n (%)				<0.001
Married	233 (64.7)	98 (65)	135 (64.5)	
Divorced	36 (10)	12 (7.9)	24 (11.5)	
Widow	31 (8.6)	8 (5.3)	23 (11)	
Single	60 (16.7)	19 (12.6)	41 (19.6)	
Tuxedo, n (%)	45 (12.5)	31 (20.5)	14 (6.7)	0.002
Alcohol intake, n (%)	60 (16.7)	38 (25.2)	22 (10.5)	0.258
Overweight, n (%)	21 (5.8)	9 (6)	12 (5.7)	0.001
Central obesity, n (%)	88 (24.4)	19 (12.6)	69 (33.0)	<0.001
DM, n (%)	14 (3.9)	8 (6.5)	6 (2.9)	<0.001
hypertension, n (%)	84 (23.3)	38 (25.2)	46 (22.0)	<0.001
Tuberculosis, n (%)	19 (5.2)	12 (7.9)	7 (3.3)	0.009
Asthma, n (%)	41 (11.4)	23 (15.2)	18 (8.6)	<0.001
Ischemic heart disease, n (%)	55 (15.3)	23 (15.2)	32 (15.3)	<0.001
BMI, Kg/m²	23.5±4.9	22.2±3.6	24.2±5.5	<0.001
toilet cm	81.7±11.9	79.7±10.7	85.4±13.2	<0.001
SBP, mmHg	137.2±22.9	139.8±21.7	135.7±23.4	<0.006
BPD, mmHg	88.7±15.7	90.3±13.2	87.8±16.9	<0.012
HR, bpm	90.3±10.6	98.4±12.4	91.4±9.2	<0.001

Quantitative and qualitative data were expressed as mean ± standard deviation (minimum-maximum) and number (%), respectively.

If we compare the two sexes, it emerges that the men were significantly overweight, n (%) 21 (6.3), central obesity, n (%) 88 (24.4) DM, n (%) 14 (4.2), hypertension, n (%) 84 (23.3) Tuberculosis, n (%) 19 (5.7), Asthma, n (%) 41 (12.3) Ischemic heart disease, n (%) 55 (16.5) BMI, Kg/m², waist circumference, PAS, PAD, heart rate and BMI (22.2±3.6 vs 24.2±5.5Kg/m²; p<0.001), WC (79.7±10.7 vs 85.4±13.2cm; p<0.001); HR (98.4±12.4 vs. 91.4±9.2bpm/min; <0.001) and PAS (139.8±21.7vs 135.7±23.4mmHg <0.006.

Cough, fever and asthenia were the main symptoms reported. Other symptoms such as Dyspnea and Ageusia are only found in 16.9% and 13.1% of patients respectively. (Table 2).

The most common biological abnormalities were as follows: increased CRP (57.7%), basocytaemia (55%), hepatic cytolysis (20.6%), elevated D-dimer (15.3%), decreased TP (17.5%) lymphopenia (16.7%), anemia (11.1%) and hyperleukocytosis 10.6% (Table 3).

The most frequent CT signs were: ground glass appearance (38.4%), alveolar condensations (25%), nodular ground glass appearance (10.7%) and band condensation (8.9%) (Table 4).

Table 2. *Distribution of patients by clinic.*

Complaints in order of importance	Percentage (%)
Cough	196 (54.4)
Fever	173 (48.0)
Asthenia	120 (33.3)
Headache	102 (28.3)
Dyspnea	61 (16.9)
Anorexia	53 (14.7)
Myalgia	51 (14.2)
Ageusia	47 (13.1)
Anosmia	41 (11.4)
Odynophagia	15 (4.2)
Vomiting	12 (3.3)
Chest pain	5 (1.4)
Hemoptysis	3 (0.8)
Abdominal pain	2 (0.6)
Eye burn	1 (0.3)
Rhinorrhea	1 (0.3)
Vertigo	1 (0.3)

Table 3. *Frequency of biological abnormalities by order of importance.*

Anomaly	NOT	Percentage (%)
CRP increased	208	57.7
Basocytaemia	198	55
hepatic cytolysis	74	20.6
VS (1st h) accelerated	64	17.8
PT decreased	63	17.5
Iymphopenia	60	16.7
D-dimer high	55	15.3
Anemia	40	11.1
Hyperleukocytosis	38	10.6
Leukopenia	24	6.7
Thrombocytopenia	14	3.9
Elevated pro calcitonin	8	2.2

Table 4. *CT scan data of patients' thorax (n=112).*

Radiological lesions (in order of frequency) (n=112)	Percentage (%)
Verre frosted	43 (38.4)
Alveolar condensation	28 (25)
Vnodular frosted earth	12 (10.7)
Band condensation	10 (8.9)
Pleural effusion	5 (4.5)
Pulmonary embolism	3 (2.7)
Nodule under pleural	1 (0.9)

5. Discussion

We report a first clinical and biological description of Congolese patients hospitalized for COVID-19. This study confirms once again that COVID-19 is a pathology that has several faces and especially with the emergence of several viral strains [22].

In this study, the mean age was 42.7±12.0 years with a sex ratio (woman/man) of 1.4 and 57.8% were over 50 years old. Our results corroborate the observations reported in the literature which revealed a high prevalence of patients with advanced age.

This advanced age also justifies the coexistence of comorbidities and high mortality in these patients. Thus, 23.3%; 3.9% and 15.3% of patients in our study were already followed respectively for arterial hypertension, diabetes mellitus and ischemic heart disease. These results confirm previous data that reported a high prevalence of arterial hypertension, diabetes mellitus in patients hospitalized for COVID-19 [23-26].

The female predominance, although little reported in the literature, our finding corroborates that reported in Algeria [27].

This predominance could be explained by the similarity in the frequency of risk factors in both sexes on the one hand and on the other hand by the fact that women consult the hospital more quickly than men.

In this study, 12.5% of patients had a history of smoking. This confirms data from the literature which shows that smokers are 2.9 times more likely to have severe complications when they are hospitalized for COVID-19 compared to non-smokers [28].

Smoking is a factor in the progression of COVID-19 disease [29, 30].

Indeed, tobacco smoke increases apoptosis and viral replication of respiratory syncytial virus and decreases the innate immunity of respiratory cells to rhinoviruses [31].

COVID-19 has different symptomatology between waves. If it was mainly respiratory for the first wave, other symptoms emerged during the second, third or even fourth wave [12, 27].

In this study, we found that cough, fever and physical asthenia were the most frequent symptoms. This observation has been made by other authors [27, 32, 10, 11].

In this study, dyspnoea, which was the first symptom encountered in patients at the onset of the disease, was reported in only 16.6% of cases.

Digestive signs, rarely mentioned at the beginning of the first wave, become frequent and can inaugurate the clinical picture, these include: anorexia (14.7%), ageusia (13.1%), odynophagia (4.2%) and vomiting (3%). These signs, although the frequency remains low, have also been found in other studies [32, 27].

During the third and fourth wave of this pandemic, we note an increase in medical consultations for digestive symptoms. Our results corroborate those reported in the literature [12, 27].

COVID-19 causes pulmonary and systemic inflammation with consequent injury and organ dysfunction [33].

Reported laboratory abnormalities such as increased CRP; Basocytaemia, first hour accelerated sedimentation rate, hepatolysis, elevated D-dimer, lymphopenia and anemia are proportional to the degree of inflammation and organ damage. The biological abnormalities observed in our patients are similar to those reported in the literature [12].

Indeed, CRP is a protein produced by the liver and serves as an early marker of infection and inflammation [34].

In addition, the CRP level is correlated with the severity of COVID-19 disease [32, 34].

Thelymphopeniais common in patients with COVID-19 and is related to disease severity [35].

In this study, 15.3% of patients showed a high D-dimer level. This observation is corroborated by reports in the literature. In effect, D-dimers, degradation products of fibrin and fibrinogen reflect both a thrombotic process, followed by activation of fibrinolysis, and systemic inflammation, caused by infection [36, 37].

Its rate has a positive correlation with the level of systemic inflammation [38].

The high rate of D-dimers is associated with thrombocytopenia which is often considered as an indicator of seriousness in sepsis. This also appears to be the case for COVID-19 infection. Our results agree with those of a recent meta-analysis [39].

Radiological profile:

Chest x-ray and CT scan are used for diagnosis of lung lesions. Given the non-specific nature of the radiological signs, chest CT is better indicated in any suspected case of COVID-19 in order to study the extent of the lesions [12].

The frequencies of the radiological signs noted in this study (Table 4) are intermediate with those observed in the literature. Indeed, in similar studies, the frequencies of

radiological signs were very variable: ground glass and focus of condensation [40, 9].

Indeed, at the initial stage, there is a predominance of ground glass images, which evolve towards an association of ground glass, reticular opacity and foci of condensation at an advanced stage [9].

Study limitations

The interpretation of our data must take into account that several biological parameters and the realization of the thoracic scanner was not possible in the patients in the present study because of financial means.

6. Conclusion

The SARS-CoV-2 infection represents a picture of systemic inflammation, the clinical and biological changes of which deserve to be known. Hence the objective of this study to determine the clinical, biological and radiological profile of patients hospitalized for COVID-19 in the DRC.

Conflicts of Interest

The authors declare no conflict of interest.

Author Contributions

All the authors contributed to the realization of this work.

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