PriMera Scientific
Medicine and Public Health
Volume 5 Issue 3 September 2024
DOI: 10.56831/PSMPH-05-163
ISSN: 2833-5627

Monitoring of Patients with Covid 19 based on Certain Biochemical Parameters

Type: Research Article
Received: August 16, 2024
Published: September 03, 2024

Citation:
Ndiaye A., et al. "Monitoring of Patients with Covid 19 based on Certain Biochemical Parameters". PriMera Scientific Medicine and Public Health 5.3 (2024): 17-22.

Ndiaye A[1,2]*, Gueye MM[6], Samba A[1,4], Thiam S[1,3], Soumah IY[1], Diedhiou F[1], Coly NF[5], Cisse F[1,3] and Diallo F[1,2]

[1]*Laboratory of Biochemistry and Molecular Biology, Faculty of Medicine, Pharmacy and Odontology, Cheikh Anta Diop University of Dakar, Senegal*

[2]*Laboratory of Biochemistry, Aristide Le Dantec Hospital, Senegal*

[3]*Laboratory of Biochemistry, Dalal Djam Hospital, Senegal*

[4]*Laboratory of Biology, Abass Ndao Hospital, Senegal*

[5]*UFR health of Thiès, Senegal*

[6]*National Hospital Center Cheikh Ahmadoul Khadim, Senagal*

***Corresponding Author:** Ndiaye A, Laboratory of Biochemistry and Molecular Biology, Faculty of Medicine, Pharmacy and Odontology, Cheikh Anta Diop University of Dakar, Senegal; Laboratory of Biochemistry, Aristide Le Dantec Hospital, Senegal.

Abstract

Introduction: In December 2019, in the city of Wuhan, Hubei province, Covid 19 appeared and spread rapidly around the world. This syndrome is associated with failure and damage to several organs; or even a disruption of cellular metabolism.

Materials and Methods: This is a prospective, descriptive and analytical study of patients infected with SARS-Cov2. For each patient, the determination of certain biochemical parameters (albumin, creatinine, urea, sodium, potassium) was carried out with the ARCHITECT plus Ci4100 PLC.

Results: Our study population consisted of 153 subjects with covid-19 with a mean age of 55 ± 19 years. Male sex represented 53.8% of the study population, with a sex ratio of 1.15. We noted that 45.1% of patients had a severe form of the disease and 50.3% had a comorbidity. The disturbances noted are hypoalbuminemia, hypercreatininemia, hyperuremia, hyponatremia and hyperkalemia.

Conclusion: The incidence of death was significantly high in patients with disruption of biochemical parameters.

Introduction

In December 2019, in the city of Wuhan, Hubei province, Covid 19 appeared, which quickly spread around the world. This syndrome is associated with failure and damage to several organs; or even a disruption of cellular metabolism. Materials and Method: This is a prospective, descriptive and analytical study focusing on patients infected with SARS-Cov2. For each patient, the dosage of ce 2019, in the city of Wuhan, Hubei province, the appearance of several cases of severe pneumonia of unknown origin was notified by the World Health Organization (WHO) [1]. These cases revealed the advent of covid 19 in this region. Three months later, it is responsible for nearly a million and a half people infected worldwide and the number of deaths has continued to increase, mainly due to comorbidities, but also to direct toxicity of the virus on the metabolism. of certain organs [2]. Indeed, subjects with an underlying pathology have an increased risk of developing a severe form of SARS-CoV-2 infection. This syndrome can be associated with multi-organ failure with myocardial, renal, enteric and hepatic lesions, particularly in elderly patients with comorbidities [3]. Thus, the exploration of certain organs could allow an understanding of the physiopathological mechanisms of infection and thus make it possible to identify strategies for diagnosis, management and prevention of subjects at risk. It is in this context that we evaluated certain biochemical parameters and see the evolution of the disease according to these parameters.

Materials and Methods

This is a prospective, descriptive and analytical study focusing on patients infected with SARS-Cov2, confirmed by RT-PCR. Blood samples were taken on a heparinized tube.

The Parameters studied was anthropometrics (age, sex , clinical symptoms).

The study population is divided into two groups: one group with a severe clinical presentation and another with a moderate clinical presentation. Moderate means type with or without fever, and severe means gastrointestinal type and fatigue, confusion type and respiratory impairment.

Regarding comorbidities, kidney disease, diabetes and high blood pressure was recorded. The biological parameters were measured on the ARCHITECT plus Ci4100 instrument.

Urea: the principle of the method used is based on the urease (enzymatic) method. In the presence of water, urease transforms urea into ammonium and CO2 and this ammonia formed, in the presence of alpha-ketoglutarate and NADH,H+ gives glutamate and NAD+, finally we measure the disappearance of NADH,H+ spectrophotometry at 340 nm which is proportional to the plasma urea concentration of the sample. The usual values for urea are 0.15 to 0.45 g/l creatinine: is measured by the JAFFE kinetic method. Picrate reacts with creatinine in an alkaline medium and gives an orange-yellow color whose intensity is proportional to the concentration of creatinine present in the test sample with usual values of 6 to 13 mg/l.

Ionogram: the dosing principle is based on the potentiometric method and is done by measuring the potential difference between a reference electrode and a specific electrode of the element to be dosed. Usual values are 135-145 mEq/l for Na+ and 3.5 to 4.5 mEq/l for K+.

Albumin: it combines with bromocresol green, at a slightly acidic pH, causing a change in color of the index, going from yellow-green to bluish-green, and proportional to the concentration of albumin present in the sample tested. Reading is done with a spectrophotometer at 630 nm with usual values of 35 to 45g/l.

All the information was recorded in Excel 2016 software and statistical analyzes were carried out using SPSS Version 25 software. Proportional hazard logistic regression analysis made it possible to evaluate the association between the parameters and the evolution of the disease. The threshold for statistical significance was set at a value of $p < 0.05$.

Results

Our study population consisted of 153 subjects with covid-19 with a mean age of 55 ± 19 years.

Male sex represented 53.8% of the study population, with a sex ratio of 1.15.

On admission, 45.1% of patients had a severe form of the disease.

Features		***Population***	***(%)***
Clinical forms	Moderate	84	54.9
	Severe	69	45.1
	Total	153	100.0
Evolution	Healings	128	83.7
	Death	25	16.3

Table 1: Clinical Characteristics of Patients.

According to the history, 50.3% of patients had a comorbidity.

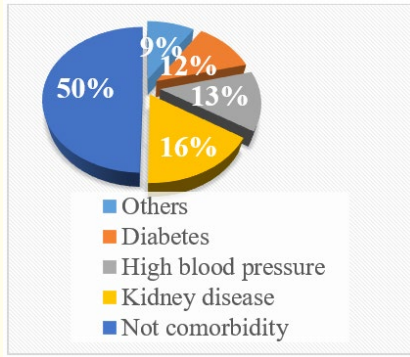

Figure 1: Population distribution by comorbidity.

Patient follow-up according to certain parameters shows that for:

- ***Albumin***, the incidence of death was significantly high in patients with decreased albumin than in patients with normal albumin.
- ***Creatinine***: the cumulative incidence of death was significantly higher in patients with elevated creatinine than in patients with low creatinine.
- ***Urea***: the cumulative incidence of mortality in patients with high urea is significantly higher than in patients with low urea.
- ***Sodium and potassium***: the cumulative incidence of death was significantly higher in patients with hyponatremia and hyperkalemia than in patients with normal serum sodium and normal serum potassium.

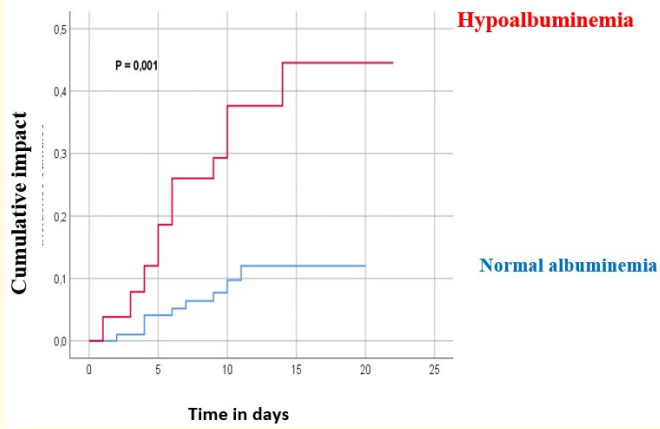

Figure 2: Cumulative incidence of death in patients with Covid-19 according to albuminemia.

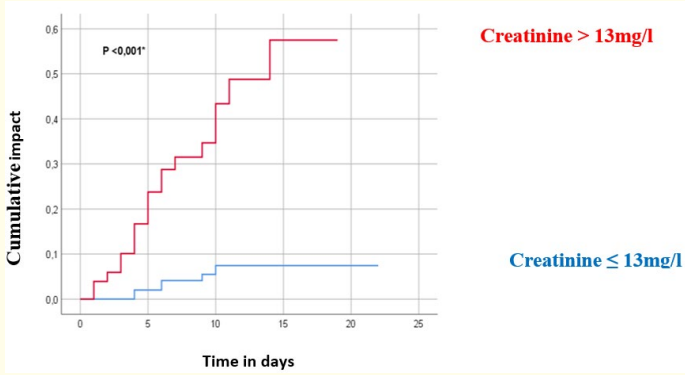

Figure 3: Cumulative incidence of death in patients with Covid-19 according to serum creatinine.

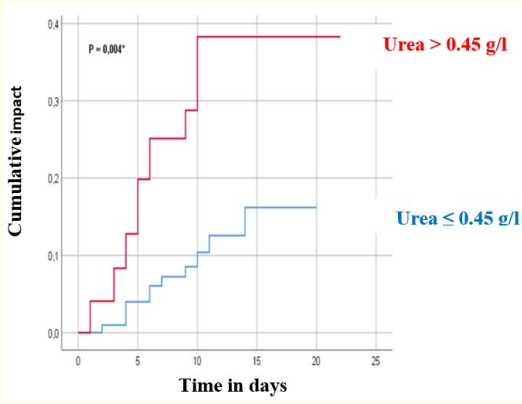

Figure 4: Cumulative incidence of death in patients with covid-19 according to uremia.

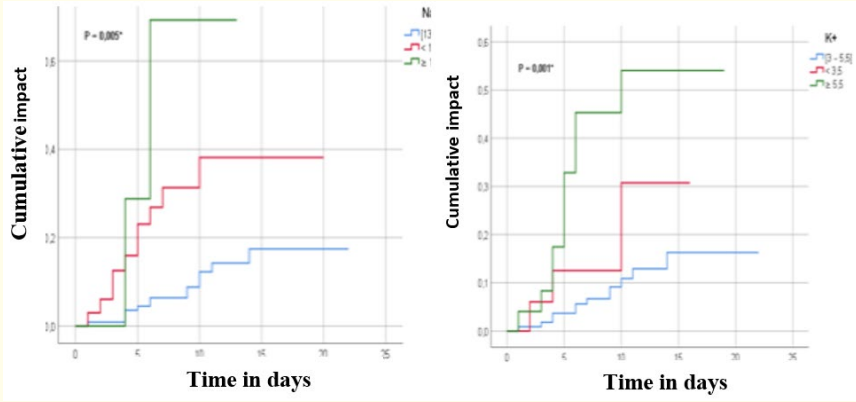

Figure 5: Cumulative incidence of death in patients with Covid-19 according to the blood ionogram.

According to the evolution, the patients who died had a severe form with a statistically significant difference.

Features	*Moderate*	*Severe*	*P-value*
Healing	84 (100%)	44 (63.8%)	<0.001*
Deaths	0 (0%)	25 (36.2%)	

Table 2: Distribution of the population according to clinical presentation and evolution.

Discussion

Coronavirus disease 2019 (COVID-19) is an infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is associated with myocardial, hepatic and renal lesions, particularly in elderly patients with comorbidities. This is the third global health threat linked to a new coronavirus in less than twenty years [4]. The particularity of the virus is its rapid transmission between humans, this speed of propagation of SARS-CoV-2 has led scientists all over the world to carry out numerous research to better understand and confront this formidable virus, described by the WHO as "enemy of humanity" [5]. Covid-19 is associated with numerous biological disorders affecting numerous tissues and/or organs, due to the ubiquitous expression of the angiotensin-converting enzyme 2 (ACE2) receptor [6] It is with this in mind that our main objective is to evaluate certain parameters during SARS-Cov2 infection.

To conduct this study we worked on data from 153 patients infected with SARS-Cov2. Epidemiologically, the average age of our study population was 55 ± 19 years. The sex ratio was 1.15 with a clear male predominance (52.8%). This can be explained by the fact that female hormones influence immune cells by stimulating the production of antibodies, and are thus potential inhibitors of the ACE2 receptor, the entry route for the coronavirus into cells [7]. Michalakis et al, in a study carried out on a French population in which men were more infected than women, put forward hypotheses linked to behavior [8].

Other studies carried out in Mali and Senegal respectively by Camara et al and by Faye et al also showed a male predominance [9, 10].

The case fatality rate of our study population was 16.3% which is similar to that of Cheng et al, a study carried out in China with a case fatality rate equal to 16.1% [11]. The association of renal biomarkers with mortality showed that the risk of death was more observed in patients who presented hypoalbuminemia (p=0.009), hyperuremia (p=0.001), hypercreatininemia (p=0.001), hyponatremia (p=0.008) and hyperkalemia (p=0.001).

It was reported in a study by Chu et al that parameters (creatinine, urea), on admission were associated with a higher risk of in-hospital death [12]. This observation was correlated with a poor prognosis regardless of the initial severity of COVID-19 and general condition.

Our results are also superimposable to those of Hatem Ali et al, who showed that the increase in these parameters is associated with a high risk of mortality [13]. And in the same sense, results obtained by Cheng et al showed that patients with hypercreatininemia were more likely to be admitted to the intensive care unit. The mechanism of disruption of these markers in COVID-19 patients is believed to be multifactorial. First, the new coronavirus could exert direct cytopathic effects on certain organs. This may lead to the detection of fragments of the coronavirus in the blood and urine in patients with the 2003 SARS virus and those with COVID-19 [14]. It was shown in a study by Wang G et al that the novel coronavirus uses angiotensin-converting enzyme 2 (ACE2) as its cellular entry receptor, which is the same as that of SARS-CoV as reported in 2003 [15].

The number of deaths is greater in patients with a severe form, and this has been reported by several authors.

Conclusion

Covid-19 is associated with numerous biological disorders affecting numerous tissues and/or organs, due to the expression of the ACE receptor which supports the entry of SARS-Cov-2 for infection of the host with significant disruption of cellular metabolism.

References

1. World Health Organization. Coronavirus disease 2019 (COVID-19): situation report 72 (2020).
2. V Bonny., et al. "COVID-19: pathophysiology of a disease with many faces". Rev. Médecine Interne, vol. 41, no. 6, (2020): 375-389.
3. R Mahieu and V Dubée. "Clinical and epidemiological characteristics of Covid-19". Actual. Pharm (2020): S0515370020302974.
4. ML Yeung., et al. "Soluble ACE2-mediated cell entry of SARS-CoV-2 via interaction with proteins related to the renin-angiotensin system". Cell 184.8 (2021): 2212-2228.e12.
5. Na Zhu., et al. "A Novel Coronavirus from Patients with Pneumonia in China, 2019". NEJM". 382 (2020): 727-733.
6. I Jamai Amir., et al. "Covid-19: Virology, Epidemiology, and Biological Diagnostics". Option/Bio 31.619 (2021): 15-20.
7. Ketfi A., et al. "Clinical, biological and radiological profile of Algerian patients hospitalized for COVID-19: preliminary data". The Pan African Medical Journal (2020).
8. Y Michalakis, MT Sofonea and S Alizon. "Could the sex-specific effects of COVID-19 in France be explained by comorbidities?".
9. M Camara. "Epidemiological profile of covid - 19 cases in commune 6 of the Bamako district". Thesis, USTTB (2021).
10. FA Faye., et al. "Setting up an epidemic treatment center (ETC) for Covid-19 in an Internal Medicine department; lessons learned". Rev. Afr. Médecine Interne 8.1-2 (2021).
11. Y Cheng., et al. "Kidney disease is associated with in-hospital death of patients with COVID-19". Kidney Int 97.5 (2020): 829-838.
12. KH Chu., et al. "Acute renal impairment in coronavirus-associated severe acute respiratory syndrome". Kidney Int 67.2 (2005): 698-705.
13. H Ali., et al. "Survival rate in acute kidney injury superimposed COVID-19 patients: a systematic review and meta-analysis". Ren. Fail 42.1 (2020): 393-397.
14. N Kin and A Vabret. "Human coronavirus infections". Rev. Francoph. Lab 487 (2016): 25-33.
15. G Wong., et al. "MERS, SARS, and Ebola: The Role of Super-Spreaders in Infectious Disease". Cell Host Microbe 18.4 (2015): 398-401.