



RESEARCH ARTICLE

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Prevalence of COVID-19 in Sickle Cell Patients in Abidjan (Ivory Coast)

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ABSTRACT

In 2019, the world faced a severe COVID-19 pandemic. Côte d'Ivoire was among the fifteen most affected countries worldwide [1], with a high prevalence of sickle cell disease, ranging from 12% to 14%. It therefore seemed crucial to study the impact of COVID-19 on sickle cell patients and their interrelationships.

The objective of this study was to determine the epidemiological, clinical, and biological profile of sickle cell patients who tested positive for COVID-19.

This was a prospective, descriptive, and analytical study conducted over a period of three months, from February to May 2022, involving 200 sickle cell patients randomly selected from three sites in Abidjan, in Côte d'Ivoire. A nasopharyngeal swab was taken from each patient after obtaining their consent and then sent to the Pasteur Institute of Abidjan for antigen testing (SARS-CoV-2). Data were collected on questionnaires, entered into Microsoft Excel, processed using SPSS software, and statistically analyzed (Chi-square, Student's t-test).

The results showed a COVID-19 prevalence of 13%; 69% of patients had the SS genotype with an average age of 27.2 years, close to the 27.4 years reported by Arlet [2]. The majority of patients were asymptomatic (98%) and had blood type O Rh positive. Patients presented with anemia (mean Hb level of 8 g/dl), moderate neutrophilic leukocytosis, and lymphopenia. Chronic anemia is characteristic of Major Sickle cell Syndromes; however, the neutrophilic leukocytosis and lymphopenia contrasted with the near absence of inflammatory signs, with only 6, 95% testing positive for CRP.

There was no statistically significant relationship between the SS genotype and COVID-19 ($P = 0.5444$). The same was true for age ($P = 0.0998$), sex ($P = 0.1015$), hemoglobin level ($p = 0.09$), and blood type ($P = 0.6963$).

Despite the susceptibility to infections in sickle cell patients, the SARS-CoV-2 coronavirus did not appear to have an impact on the subjects in our study. This could be explained by the small size of our sample. However, SARS-CoV-2 infection can manifest solely as a vaso-occlusive crisis, without any associated infectious or respiratory symptoms [3].

Conclusion: The low vaccination rate (1%) underscores the need for intensified awareness campaigns to encourage sickle cell patients to get vaccinated against COVID-19. It is imperative to make COVID-19 screening systematic for sickle cell patients in Côte d'Ivoire.

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Introduction

In 2019, the world faced a serious COVID-19 pandemic (Coronavirus Disease 2019) caused by the new Severe Acute Respiratory Syndrome virus (SARS-CoV-2). Since its first detection in China [4-6], the spread of COVID-19 has raised important concerns worldwide. It mainly affects elderly people or those with chronic diseases. Ivory Coast was among the fifteen most affected countries [1].

Sickle cell disease is the most common of the hereditary hemoglobin disorders worldwide. In Ivory Coast, the prevalence is high, between 12 to 14% [7]. However very few work on COVID 19 t Sickle cell disease had been published at that time.

In this context, it seemed critical to us to study the impact of COVID-19 on sickle cell patients and their interrelations.

The main objective was to determine the epidemiological, clinical, and biological profile of sickle cell patients positive for COVID-19 (SARS-CoV-2). The specific objectives were:

- to determine the prevalence of SARS-CoV-2 within the study population
- to describe the epidemiological characteristics of SARS-CoV-2+ sickle cell patients
- to discuss the vaccination status of SARS-CoV-2+ sickle cell patients
- to analyze the hemoglobin genotype of SARS-CoV-2+ sickle cell patients and their interrelations with COVID-19.

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Methodology

Type and Population study

This is a prospective, descriptive, and analytical study carried out over a period of three (3) months, from February to May 2022, on 200 sickle cell patients followed in the hematology departments of the Teaching Hospitals of Treichville & Cocody and the sickle cell unit of the National Blood Transfusion Center. Included in the study were sickle cell patients over 5 years old, registered and followed at the 3 study sites, and who agreed to be screened.

Sampling

The survey base was established from information (electronic data or paper records) obtained both from the hematology departments of the University Hospitals of Treichville and Cocody, and the CNTS. Patients were selected through random sampling by draw.

Screening Technique

It involves a nasopharyngeal sample from each patient by a lab technician or a nurse, which is then sent to the Pasteur Institute of Abidjan to perform the antigen test (SARS-CoV-2).

Data Gathering and Analysis

Data were collected on questionnaires, entered into Microsoft Excel, processed using SPSS software, and statistically analyzed including epidemiologic characteristics, calculation of percentages for categorical variables, and means and standard deviations, medians, and quartiles for continuous variables. Chi-square and Student's t-tests were used to determine the degree of correlation between variables ($p < 0.05$).

Results

Epidemiological characteristics

The results show that twenty-six (26) patients out of the 200 tested with the SARS COV-2 antigen test were positive, representing a COVID-19 prevalence of 13%.

The age distribution reveal that 61% of SARS COV-2 positive patients were over 30 years old. The average age is 27.2 years, with extremes of 7 and 41 years. The majority of the patients were male (56%) with a sex ratio of 1.16.

According to the place of residence, 19.2% of patients live in Abidjan; 16% were nationals of the Economic Community of West African States (ECOWAS) such as Burkina Faso, Mali, Benin, Guinea, Ghana, etc., Abidjan being a cosmopolitan city. Côte d'Ivoire also hosts 22% of foreigners according to the 2021 General Population and Housing Census (RGPH).

The COVID-19 vaccination status of patients is very low at 1%. Also, the analysis of the patients' hemoglobin genotypes shows that 69% of SARS Co2- positive patients were SS (homozygous form), followed by the heterozygous SC form (18%) (Table 1).

The findings of the blood count shows an average hemoglobin level of 8 g/dl and average values of white blood cells of 14.8 g/dl, neutrophils of 19 g/l, and lymphocytes of 0.71 g/l. (Table 2).

Table 1: Distribution of SARS COV-2 positive sickle cell patients according to hemoglobin genotype (N=26).

Hb Genotype	SSFA2	SC	SFA2	SAFA2
Proportion	69%	15%	8%	8%

Table 2: Distribution of patients according to blood count.

Parameter	Average	Standard deviation	Median	Minimum	Maximum
RBC	3,44	1,1	3,1	1,7	5,6
Hb (g/dl)	8	2,1	3,1	4,4	14,6
PLT (G/L)	409	185,2	401	139	971
WBC (G/L)	14,8	16,7	11,85	3,6	28
NEUT (G/L)	10	15,2	6,23	1,7	22,7
Lymphocyte (G/L)	0,71	0,53	1,87	1,25	9,3
Monocyte (G/L)	0,71	0,54	0,65	0,01	1,9

Regarding other biological variables, only 6,95% of patients had a positive CRP; 27% were blood group O, followed by groups A (19%), B (11%), AB (8%), ND (35%), and 98% had a Rh+ factor.

The statistical analysis showed that there is no statistically significant relationship between the SS genotype and COVID ($P=0.5444$). The same applies to age ($P=0.0998$), sex ($P=0.1015$), hemoglobin level ($P=0.09$), and blood group ($P=0.6963$).

Discussions

The prevalence of COVID-19 among sickle cell patients in our series was 13% SARS-CoV-2 positive. Most of the patients were homozygous (SS) accounting for 69%, compared to 80% (SS & S/ β 0) in France as reported by ARLET et al. [2], who studied a cohort of 536 sickle cell patients infected with SARS-CoV-2, out of 319 hospitalized patients and 217 non-hospitalized patients.

The average age of our patients is 27.2 years old, close to the 27.4 years old \pm 12.7 reported by Arlet t al. [1]. The higher age (30 years) observed in patients with sickle cell disease is consistent with data in the literature [7].

The vaccination status was 1% in our study. This low proportion could be explained by the fact that patients with sickle cell disease were reluctant to get vaccinated for fear of triggering a crisis, but also due to lack of information. COVID-19 vaccination is now strongly recommended for patients with sickle cell disease in order to limit severe forms [8].

Clinically, only 8% of patients who tested positive for SARS-CoV-2 presented with symptoms at the time of testing. Despite the susceptibility to infections in patients with sickle cell disease, the SARS-CoV-2 coronavirus does not appear to have had an impact on the subjects in our study. This could be explained by the small size of our sample: only 26 out of 200 patients tested positive for SARS-CoV-2, compared to 536 in Arlet's study. Unlike Arlet's study, our patients were randomly selected from sickle cell patients regularly followed in outpatient settings. Furthermore, in Arlet's study, hospitalized patients experienced more vaso-occlusive crises and were more anemic than outpatients. The most frequent symptoms were fever and dyspnea.

It is now well established that patients with sickle cell disease may be at increased risk of serious complications related to COVID-19, including the development of acute chest syndrome (ACS), for the infection itself being a trigger for vaso-occlusive crises (VOCs) [3,8]. COVID-19 can be particularly severe and fatal in the elderly or those with chronic illnesses [8]. SARS-CoV-2 infection can manifest solely as vaso-occlusive crises (VOCs), without any infectious or respiratory symptoms [3,8].

The SARS-CoV-2-positive sickle cell patients in our series presented with anemia, with an average hemoglobin level of 8 g/dl, moderate neutrophilic leukocytosis, and lymphopenia. Consistent with data in the literature, chronic anemia is characteristic of sickle cell disease, particularly in major sickle cell syndromes such as SS syndrome and S/ β 0 thalassemia [7]. The neutrophilic leukocytosis observed in our series contrasts with the near absence of inflammatory signs in these patients, as only 6.95% of them had a positive CRP. Furthermore, recent studies conducted in 2025 have shown that COVID-19 infection also induces a decrease in the absolute number of lymphocytes and alters the CD4/CD8 ratio and an absence of functional biological signs may be observed [3].

Regarding the other variables, the patients were predominantly blood type O (27%) and Rh positive (98%). It is well known that blood type O Rh+ is the most common worldwide.

There is no statistically significant relationship between sickle cell disease genotype and SARS-CoV-2 antigen test ($p = 0.5444$). This observation could be confirmed or refuted by a more in-depth study with a larger sample.

Conclusions

Our work revealed a COVID-19 prevalence of 13% among 200 sickle cell patients tested; 69% of these patients had the SS genotype. The majority were asymptomatic (98%) and had blood type O Rh+. There was no statistically significant relationship between the SS genotype and COVID-19 ($P = 0.5444$). This applied also for age ($P = 0.0998$), sex ($P = 0.1015$), hemoglobin level ($p = 0.09$), and blood type ($P = 0.6963$).

The low vaccination rate (1%) underscores the need to intensify awareness campaigns to encourage sickle cell patients to get vaccinated against COVID-19. It is imperative to make COVID-19 screening systematic for sickle cell patients in Côte d'Ivoire.

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