Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Infectious Diseases Now 52 (2022) 44–46

Available online at ScienceDirect www.sciencedirect.com

Elsevier Masson France EM|consulte www.em-consulte.com/en

Short communication

Demographics and outcomes of laboratory-confirmed COVID-19 cases during the first epidemic wave in Senegal

A.T.D.-D. Lawson[a], M. Dieng[a], F.A. Faye[b], P.A. Diaw[c], C. Kempf[d], A. Berthe[a], M.M. Diop[a], M. Martinot[d,*], S.A. Diop[a]

[a] UFR of Health Sciences, University of Thiès, Thiès, Senegal
[b] UFR of Health Sciences, University of Bambey, Bambey, Senegal
[c] Institute for Research in Health Sciences and formation (IRESSEF), Rufisque, Senegal
[d] Colmar Civil Hospitals, Colmar, France

ARTICLE INFO

Article history:
Received 19 August 2021
Received in revised form
12 September 2021
Accepted 5 October 2021
Available online 8 October 2021

ABSTRACT

Background: Few studies have focused on the effects of COVID-19 on African populations. During the first epidemic wave in Senegal (May 1 to July 31, 2020), COVID-19 cases were isolated in treatment centers of epidemics (TCEs). We described the demographics and outcomes of COVID-19 cases in TCEs.
Patients and methods: All cases with laboratory-confirmed COVID-19 in Thiès medical region of Senegal were included.
Results: COVID-19 was confirmed in 600 cases. Median age of cases (men: 357, 59.5%; women: 243, 40.5%) was 34.0 years. The incidence was 12 per 100,000 inhabitants per month. Overall, 46 (7.7%) cases had a severe or critical form of the disease, and nine of them died. Of 455 cases quarantined in non-hospital TCEs, 340 (74.7%) had no symptom and 115 (25.3%) had mild or moderate symptoms.
Conclusion: In this African retrospective cohort, COVID-19 cases were young and mostly asymptomatic with a low case fatality rate.

1. Background

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic is a global public health problem; however, few studies have reported its impact on African populations [1]. The first case was diagnosed in Senegal by the beginning of March 2020 [2]. During the first wave of coronavirus disease 2019 (COVID-19), individuals who tested positive for COVID-19 were isolated at the Treatment Center of Epidemics (TCE). Senegalese health authorities adopted two management strategies for Thiès medical region, which is located 70 km from Dakar and comprises three departments (Thiès and Tivaouane with 1,390,602 inhabitants, and Mbour, one-third of which directly depends on Thiès medical region, i.e., around 276,831 inhabitants). Patients with the most severe forms or with high-risk conditions for severe COVID-19 were hospitalized at TCE at the Thiès Hospital (hTCE), whereas those with minor or no symptoms, both diagnosed via contact tracing or screening campaign, were quarantined with regular follow-up at the out-of-hospital TCE (oTCE) in Thiès military base. This study aimed to describe the incidence, demographic characteristics, and outcomes of patients with laboratory-confirmed COVID-19 in Thiès medical region during the first epidemic wave between May 1, 2020, and July 31, 2020.

2. Methods

Individuals suspected of having COVID-19, mainly diagnosed in the hospital based on indicative symptoms and during screening campaigns at the Blaise Diagne International airport, were tested using reverse transcriptase polymerase chain reaction (RT-PCR) for SARS-CoV-2. In case of a positive result, those who had come into contact with these members, mainly in collective habitations, were also tested. We retrospectively analyzed the patients' demographic data (age and sex); the severity of clinical manifestations (mild/moderate/severe) at admission, as previously reported [3], and the outcomes of patients with COVID-19. COVID-19 was confirmed by a positive RT-PCR test for SARS-CoV-2 that was performed at the regional reference laboratory (Institute for Research in Health Sciences and Formation) with the Abbott® RealTime SARS-CoV-2 assay (Abbott Laboratories, Abbott Park, IL, USA) and the Allplex® SARS-CoV-2 assay (Seegene Inc., Seoul, South Korea). Patients in the oTCE were isolated for at least 7 days. The discharge criterion was arbitrarily based on two consecutive negative RT-PCR tests performed at least 48 hours apart. An RT-PCR test was performed every 48 hours.

* Corresponding author. Infectious Diseases Department, Hôpitaux Civils de Colmar, 39, avenue de la Liberté, 68024 Colmar, France.
E-mail address: martin.martinot@ch-colmar.fr (M. Martinot).

https://doi.org/10.1016/j.idnow.2021.10.003

Table 1
Demographic characteristics and mortality as per baseline status.

	Non-severe ($n = 554$)	Severe ($n = 46$)	All cases ($n = 600$)	*P*-value
Gender				
Male	330 (59.6%)	27 (58.7%)	357 (59.5%)	> 0.999[a]
Women	224 (40.4%)	19 (41.3%)	243 (40.5%)	
Age (years)				
n (%)	542 (97.83%)	46 (100.00%)	588 (98.00%)	< 0.001[b]
Missing values (%)	12 (2.17%)	0	12 (2.00%)	
Mean (SD)	34.3 (16.4)	67.7 (9.1)	36.9 (18.3)	
95% CI	[32.9; 35.6]	[65.1; 70.3]	[35.4; 38.4]	
Median [Q1, Q3]	32.0 [23; 46]	68.0 [60; 70]	34.0 [23; 50]	
Range	[1; 86]	[52; 88]	[1; 88]	
Death				
No	554 (100.0%)	37 (80.4%)	591 (98.5%)	< 0.001[a]
Yes	–	9 (19.6%)	9 (1.5%)	

Results are presented as *n* (%) [95% CI], % values are calculated for the non-missing values only.
CI: confidence interval; SD: standard deviation; Q: quartile.
[a] Fisher's exact test.
[b] Wilcoxon rank-sum test.

Overall baseline characteristics were documented and classified according to the patients' status (severe/critical vs. non-severe and survivors vs. non-survivors) at the cutoff date (July 31, 2020). Continuous variables were expressed as median and range (first and third quartiles or extremes) and compared using the Wilcoxon rank-sum test. Categorical data were calculated as the number of missing values and absolute and relative counts, and compared using Fisher's exact test. To analyze statistical data, we used SAS version 9.4 (SAS Institute, Cary, NC, USA).

3. Results

During the study period, 600 cases of COVID-19 were diagnosed, including 59.5% of men and 40.5% of women with a median age of 34.0 years. At baseline, 46 cases (7.7%) with a severe or critical form of COVID-19 and 99 (16.5%) non-severe cases with high-risk conditions were hospitalized at the hTCE. A total of 455 COVID-19 cases (75.8%), including six pregnant women, four breastfeeding women, and 49 children ($\leq$ 14 years), were quarantined at the oTCE. The 46 cases with severe disease were older (median age 68 years, range 52–88 years) than the 99 without severe disease (median age 45 years, range 7–78 years; $P < 0.0001$) or the 455 cases in the oTCE (median age 30 years, range 1–86 years; $P < 0.0001$). Among the 46 cases who were hospitalized at Thiès hTCE, nine died (median age 73 years, range 52–88 years, seven men and two women), resulting in a global case fatality rate of 1.5% (Table 1). The 99 cases at the hTCE without severe symptoms were followed, and none presented severe disease during the follow-up.

Among the 455 cases at the oTCE, 26 had at least one comorbidity (hypertension, $n = 19$; diabetes, $n = 4$; asthma, $n = 2$; sickle cell diseases, $n = 1$). There were 340 (74.7%) asymptomatic cases and 115 (25.3%) mild or moderate cases in the oTCE population. The average duration of follow-up at the oTCE was 17.7 ± 8.33 days (range 9–25 days). Most cases (97.8%) at the oTCE had favorable outcome, and only two developed a severe form requiring oxygen supply in Dakar. A comparison of the symptomatic and asymptomatic cases at the oTCE performed for 424 patients with full available virological data showed that time to discharge (two negative RT-PCR tests) was longer in asymptomatic patients (median of 18 days, range 2–115 days) than symptomatic cases (12 days, range 5–27 days) ($P < 0.001$). We determined that the incidence of laboratory-confirmed COVID-19 in Thiès medical region during the first epidemic wave was 12 per 100,000 inhabitants per month.

4. Discussion

This study reports exhaustive data on the outbreak of COVID-19 in Senegal. It is an important study considering the lack of data on COVID-19 among African populations. This data focuses on the first epidemic wave and underscores that severe cases were uncommon, corresponding to 7.7% of all diagnoses at baseline. Our results also reveal that the overall case fatality rate was low (1.5%), similar to that reported by other West African countries [4]. When comparing case fatalities between Senegal and France, between May 1 and July 30, 2020, mortality was much higher in France than in Senegal (14.5%–13.4% vs. 0.88%–2%) [5]. This was probably due to a much more overwhelming first epidemic wave affecting an older and more comorbid population in France. Asymptomatic cases were therefore the most frequent form of the disease in Senegal, comprising 71.8% of cases at the oTCE, which is in the upper range of previous studies [6–8]. The need for quarantine at the oTCE for COVID-19 cases enabled a prolonged follow-up at the oTCE, with regular examinations confirming the diagnosis of asymptomatic cases and excluding mild or moderate COVID-19 cases. Our results seem similar to recent data on the Mauritanian outbreak, with 84% of asymptomatic cases [9]. However, the distinction between asymptomatic or pre-symptomatic status was not clearly defined in this Mauritanian study. In our study, asymptomatic cases at the oTCE had a longer time to discharge due to a longer time to obtain a negative RT-PCR test result than symptomatic cases, as already reported [10]. This high prevalence of asymptomatic cases and low case fatality rate might be related to the younger age of the African population [4]. With a male proportion of 59.5% and a median age of 34 years in our population, the stratification by age and sex seemed similar to other reports on African subjects [9]. These data are important because they highlight the challenges faced in screening patients with COVID-19 in Africa because of the high number of asymptomatic cases. Our study included all cases with positive test results, which were the only reliable data available to determine the incidence of COVID-19 during the first epidemic wave in Senegal. However, this incidence is only representative of Thiès region (urban district) and is quite certainly underestimated because of a high number of patients not being tested. Numerous cases likely did not seek medical advice, particularly those with mild or moderate symptoms, because of very moderate symptoms, fear of diagnosis, or unwillingness to be quarantined. Contact tracing was not 100% efficient as it was only performed in residential buildings and collective habitations.

The local epidemiology of the regional variants at the time of the study was assessed in a study by Padane et al. [11], who sequenced

86 viruses from patients from Thiès Region and Blaise Diagne International Airport. Test specimens were mainly collected in 2020. Virological sequencing performed on 83 samples showed that the B1 (63%), B1.1.29 (16%), and B.1256 (9%) lineages were circulating in the Thiès region in 2020.

There are however biases in our study owing to missing data (comorbidities, discharge date, and absolute certitude of persistence of asymptomatic status during follow-up) in the non-informative medical charts. Nevertheless, the mortality rate was low with an overall case fatality of 1.5% and accounted for 19.6% of severe cases. This figure is similar to those reported in other African reports [12,13]. The incidence was 12 per 100,000 inhabitants per month. However, these data represent the lower range of estimation owing to the lack of testing and the high rate of asymptomatic or paucisymptomatic cases, as explained above. A seroprevalence study performed in the Democratic Republic of the Congo highlighted this point [14].

5. Conclusions

In this retrospective cohort, most patients with COVID-19 were young with limited comorbidities, similar to the population of sub-Saharan African countries. Most cases were asymptomatic, and the case fatality was low (predominantly occurring in older and male patients).

Contribution of authors

AL, MM, and SD conceived and designed the study, analyzed the data and drafted the article. ATD and SAD collected the data. FAF performed the virological analysis. CK analyzed the data and performed the statistical analyses. All authors read and approved the article.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the 1964 Helsinki declaration and its later amendments.

Disclosure of interest

The authors declare that they have no competing interest.

Acknowledgments

The authors sincerely thank all healthcare and non-healthcare professionals who took care of the patients infected by SARS-CoV-2 at Thiès medical region during the COVID-19 pandemics.

References

[1] Guleid FH, Oyando R, Kabia E, Mumbi A, Akech S, Barasa E. A bibliometric analysis of COVID-19 research in Africa. BMJ Glob Health 2021;6(5), http://dx.doi.org/10.1136/bmjgh-2021-005690.
[2] Dia N, Lakh NA, Diagne MM, Mbaye KD, Taieb F, Fall NM, et al. COVID-19 outbreak, Senegal, 2020. Emerg Infect Dis 2020;26(11):2772–4, http://dx.doi.org/10.3201/eid2611.202615.
[3] Gandhi RT, Lynch JB, Del Rio C. Mild or moderate COVID-19. N Engl J Med 2020;383(18):1757–66, http://dx.doi.org/10.1056/NEJMcp2009249.
[4] Bamgboye EL, Omiye JA, Afolaranmi OJ, Davids MR, Tannor EK, Wadee S, et al. COVID-19 pandemic: is Africa different? J Natl Med Assoc 2020;113:324–35, http://dx.doi.org/10.1016/j.jnma.2020.10.001.
[5] Ritchie H, Mathieu E, Rodés-Guirao L, Appel C, Giattino C, Ortiz-Ospina E, et al. "Coronavirus Pandemic (COVID-19)". Published online at OurWorldInData.org. Retrieved from: https://ourworldindata.org/coronavirus [Online Resource]. Last accessed 09/09/2021.
[6] Lavezzo E, Franchin E, Ciavarella C, Cuomo-Dannenburg G, Barzon L, Del Vecchio C, et al. Suppression of a SARS-CoV-2 outbreak in the Italian municipality of Vo'. Nature 2020;584(7821):425–9, http://dx.doi.org/10.1038/s41586-020-2488-1.
[7] Oran DP, Topol EJ. The proportion of SARS-CoV-2 infections that are asymptomatic: a systematic review. Ann Intern Med 2021;174(5):655–62, http://dx.doi.org/10.7326/M20-6976.
[8] Buitrago-Garcia D, Egli-Gany D, Counotte MJ, Hossmann S, Imeri H, Ipekci AM, et al. Occurrence and transmission potential of asymptomatic and pre-symptomatic SARS-CoV-2 infections: a living systematic review and meta-analysis. PLoS Med 2020;17(9):e1003346, http://dx.doi.org/10.1371/journal.pmed.1003346.
[9] El Vally A, Bollahi MA, Ould Ahmedou Salem MS, Deida J, Parola P, Basco L, et al. Retrospective overview of a COVID-19 outbreak in Mauritania. New Microbes New Infect 2020;38:100788, http://dx.doi.org/10.1016/j.nmni.2020.100788.
[10] Long QX, Tang XJ, Shi QL, Li Q, Deng HJ, Yuan J, et al. Clinical and immunological assessment of asymptomatic SARS-CoV-2 infections. Nat Med 2020;26(8):1200–4, http://dx.doi.org/10.1038/s41591-020-0965-6.
[11] Padane A, Kanteh A, Leye N, Mboup A, Manneh J, Mbow M, et al. First detection of SARS-CoV-2 variant B.1.1.7 in Senegal. New Microbes New Infect 2021;41:100877, http://dx.doi.org/10.1016/j.nmni.2021.100877.
[12] Matangila JR, Nyembu RK, Telo GM, Ngoy CD, Sakobo TM, Massolo JM, et al. Clinical characteristics of COVID-19 patients hospitalized at Clinique Ngaliema, a public hospital in Kinshasa, in the Democratic Republic of Congo: a retrospective cohort study. PLoS One 2020;15(12):e0244272, http://dx.doi.org/10.1371/journal.pone.0244272.
[13] Nachega JB, Ishoso DK, Otokoye JO, Hermans MP, Machekano RN, Sam-Agudu NA, et al. Clinical characteristics and outcomes of patients hospitalized for COVID-19 in Africa: early insights from the Democratic Republic of the Congo. Am J Trop Med Hyg 2020;103(6):2419–28, http://dx.doi.org/10.4269/ajtmh.20-1240.
[14] Nkuba AN, Makiala SM, Guichet E, Tshiminyi PM, Bazitama YM, Yambayamba MK, et al. High prevalence of anti-SARS-CoV-2 antibodies after the first wave of COVID-19 in Kinshasa, Democratic Republic of the Congo: results of a cross-sectional household-based survey. Clin Infect Dis 2021, http://dx.doi.org/10.1093/cid/ciab515.