High SARS-CoV-2 seroprevalence among health care workers in Bamako referral hospitals: a prospective multisite cross-sectional study (ANRS COV11)

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High SARS-CoV-2 Seroprevalence among Healthcare Workers in Bamako Referral Hospitals: A Prospective Multi-Site Cross-sectional Study (ANRS COV11)

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RUNNING TITLE: SARS-CoV-2 among caregivers of Bamako

Text word count: 840

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KEYWORDS

SARS-CoV-2; Africa; Seroprevalence; Anti-nucleocapsid antibodies; Healthcare workers.

To the Editor,

The COVID-19 outbreak has affected some parts of the globe more than others. Mali, like the majority of African countries, has reported much fewer deaths and cases related to COVID-19 when compared to more affected states. As of December 2nd, 2021, there have been 17339 confirmed cases from a population of more than 20 million people. These figures may be underestimated due to weak organization of the health system and low screening capacity.

Serological rapid diagnostic tests could be used as tools to inform public health authorities on the development of herd immunity and spread within a population. A particularly affected population group is that of healthcare workers (HCW), representing up to 14% of those infected with COVID-19. In Mali, there is currently no official data on the number of caregivers infected with COVID-19. Therefore, the aim of this study was to determine the seroprevalence of SARS-CoV-2 among HCW in Bamako hospitals and to determine predictive factors associated with positive serology.

We conducted a prospective study among HCW older than 18 years working in three referral hospitals with a center for COVID-19 patient management in Bamako (Gabriel Toure University Hospital, Dermatology Hospital of Bamako, and Mali Hospital). Clinical and socio-demographic data were obtained from participants' records or collected after inclusion. The Panbio™ IgG/IgM COVID-19 Rapid Test Device (Abbott Diagnostics, North Chicago, IL, USA; specificities ≥94% for IgG and IgM (1)) was performed according to the manufacturer's instructions for qualitative detection of IgG and IgM directed against SARS-CoV-2 nucleocapsid. Wilcoxon and Chi-Square statistics were used to assess statistical significance between groups for continuous and categorical variables, respectively. All variables providing a p-value ≤ 0.1 in the univariate analysis were retained for building the final multivariate model.

From 16th March 2021 to 15th July 2021, 200 HCW were consecutively included in our study. The enrollment period coincided with the second wave of the COVID-19 epidemic in Mali.

Socio-demographic characteristics of the participants are presented in Table 1. Only 1% of HCW reported being a smoker. Median BMI was 24.2 kg/m² (IQR: 21.1-27.3) overall. Symptoms reported at the time of screening were: rhinitis (3.5%), headache (3.0%), cough (2.5%), fever (1.5%), and thoracic pain (1.5%). Three percent of participants mentioned previous medical history of sinusitis/rhinitis. None reported symptoms of severe COVID-19. Twenty-one HCW reported having been in contact with a confirmed case of COVID-19 (10.5%). Finally, 29.2% of the participants were vaccinated for COVID-19 with Vaxzevria® by the time of the screening.

After inclusion, five participants refused the blood sample. Anti-nucleocapsid SARS-CoV-2 IgG were detected for 51.8% (101/195) of HCW. Only 2 of the 195 samples were positive for IgM (1.0%; one IgG positive and one IgG negative with IgG remaining negative one month later). In univariate analysis, it was determined that there were two predictive factors for positive serology: to be a paramedical staff (n=53, 42/53 nurses; Odds Ratio=2.4, 95%CI 1.1-4.9, *p*=0.020) and having ≥8 individuals living in the household (OR=2.4, 95%CI 1.3-4.3, *p*=0.003). Considering these two variables, only the number of people living in the household (≥8 versus <8) was an independent predictive factor of a positive serology.

In this study, we report a high seroprevalence of 51.8% among HCW in Bamako referral hospitals. These results are notably higher to what has been observed among the general population in Democratic Republic of Congo and Cameroon (2,3), but are in line with a recent work revealing a SARS-CoV-2 exposure rate of around 58% among three Malian communities after the first wave (4). Anti-nucleocapsid antibodies allow an estimation of viral spread by seroprevalence in the context of spike-based vaccination but vanish within several months. Then, our results could have been slightly underestimated, also because of non-detection of very recent infections. Moreover, only 16.6% of the staff of the three hospitals were screened. In any case, it suggests a dramatic SARS-CoV-2 spread among HCW in a West African country, supporting what has been shown in Nigeria (5). Characteristics such as the median age of the population (29 years) could explain the majority of asymptomatic

cases reported in this study. However, the spread of COVID-19 is an important concern as high viral circulation may lead to the selection of problematic SARS-CoV-2 variants.

Living in a household of >8 individuals was the only independent risk factor predictive of a positive serology, reflecting that the concentration of people is a key factor in this outbreak. In Mali, vaccination was initiated at the peak of the second wave, concomitantly to this study, and only 29.2% of study participants were vaccinated. This possibly explains why the seroprevalence did not differ according to vaccination status (p=0.834).

In conclusions, our study showed a high seroprevalence among HCW in Bamako and confirmed a large spread of SARS-CoV-2 virus in the region despite of a previously under-reported circulation in Africa. In this context, screening and molecular surveillance capacities should be enhanced. HCW are on the frontline of the epidemic and should be considered for priority vaccination as much for their own protection as for the collective protection of public health.

Transparency declaration

Conflict of Interest

None.

Funding

This study is part of clinical trial ANRS COV11 (BamaCoV) funded by the Agence Nationale de Recherches sur le SIDA et les hépatites virales ANRS| Emerging Infectious diseases and sponsored by the French National Institute for Health and Medical Research (INSERM; reference C20-41).

Ethics

The study was approved by the Ethics Committee of the Faculty of Medicine, Dentistry and Pharmacy of Bamako (opinion number 2021/13/CE/USTTB) and by the Institutional Review Board “CEEI” Committee of INSERM (opinion number 20-743). It was authorized by the Commission nationale de l'informatique et des libertés (CNIL, France; N°921130) and registered in a public trial registry (https://ClinicalTrials.gov NCT04710316). Written informed consent was obtained from the participants, and confidentiality of the data was ensured.

Acknowledgments

We thank Abbott Diagnostics (North Chicago, IL, USA) for Panbio™ IgG/IgM COVID-19 Rapid Test Device donation.

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. Participant socio-demographic characteristics.

Significative	Overall N=200	Positive serology N=101	Negative serology N=94	*p*-value (univariate analysis)
Age, years, median (IQR)	29.0 (25.0-35.0)	29.0 (25.0-35.0)	29.0 (25.0-35.0)	0.897
Male gender, n/N (%)	114/200 (57.0)	59/101 (58.4)	53/94 (56.4)	0.774
Marital status married, n/N (%)	110/200 (55.0)	57/101 (56.4)	51/94 (54.3)	0.568
Household people number, median (IQR)	7.0 (5.0-11.0)	8.5 (6.0-12.0)	6.0 (4.0-10.8)	**0.013**
Public transport use (bus), n/N (%)	38/198 (19.2)	75/99 (75.8)	80/94 (85.1)	0.103
Commutation time, min, median (IQR)	30.0 (15.0-45.0)	30.0 (15.0-45.0)	30.0 (15.0-36.3)	0.290
Urban residence, n/N (%)	123/198 (62.1)	61/101 (60.4)	59/92 (64.1)	0.593
Profession				
Medical staff, n/N (%)	74/200 (37.0)	33/101 (32.7)	36/94 (38.3)	0.754
Paramedical staff, n/N (%)	53/200 (26.5)	35/101 (34.7)	18/94 (19.1)	**0.021**
Administrative and service staff, n/N (%)	73/200 (36.5)	33/101 (32.7)	40/94 (42.5)	0.154
Level of Education				
Elementary, n (%)	41/200 (20.5)	19/101 (18.8)	22/94 (23.4)	0.432
Secondary, n (%)	33/200 (16.5)	22/101 (21.8)	11/94 (11.7)	0.113
University/doctorate, n (%)	118/200 (59.0)	55/101 (54.5)	58/94 (61.7)	0.971
Vaccinated participants, n/N (%)	52/178 (29.2)	27/91 (29.7)	24/83 (28.9)	0.834
COVID-19 confirmed case contact, n/N (%)	21/194 (10.5)	15/100 (15)	6/94 (6.4)	0.053

Significative *p*-value (univariate analysis) in bold.
IQR: interquartile range (25th and 75th percentile).

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