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Letter to the Editor

SARS-CoV-2 antibodies and utility of point of care testing in Health Care Workers from a Spanish University Hospital in Madrid

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ARTICLE INFO

Article history:

Received 7 January 2021

Received in revised form

3 March 2021

Accepted 6 March 2021

Available online 1 April 2021

Editor: L. Leibovici

To the Editor

Spain is one of the countries most affected by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic. There were nearly two million confirmed cases and more than 50 000 deaths by December 2020 [1]. A recent national serological surveillance study carried out in our country detected an overall 5% seroprevalence in the general population, with important geographical variability that ranged from 3% to 10% [2].

Health-care workers (HCW) have an increased risk of exposure to SARS-CoV-2. Household contacts and the socialization between HCW could also give exposure to infection.

Our objective was to analyse the impact of the first peak of the coronavirus disease 2019 (COVID-19) pandemic in HCW from a tertiary teaching hospital in Madrid (Spain), as well as evaluate a lateral flow immunoassay (LFIA) for applicability to seroprevalence studies. The study was carried out in May–June 2020, during the

slowdown phase of the epidemic wave. To avoid selection bias, serology testing was offered to all staff working in the hospital (6747 HCW). Testing was performed by a LFIA (Hangzhou ALLTEST Biotech Co. Ltd, Hangzhou, China) in whole blood for fast identification of IgG and IgM antibodies against SARS-CoV-2, and secondly serum samples were tested by Vircell COVID-19 ELISA IgG and IgM/IgA test (Vircell Spain S.L.U., Granada, Spain). Ethical approval was obtained from the Hospital Ethics Committee of Clinical Research (Ref 249/20) with a waiver of informed consent. Those participants with a positive IgM result were tested with an SARS-CoV-2 RT-PCR (TaqMan 2019-nCoV Assay kit v1, ThermoFisher Scientific, Inc. Waltham, MA, USA). In this group, a second serum sample was obtained 2 weeks after the first one for IgG seroconversion analysis.

Overall, 5875/6753 HCW (87.0%) participated in the study (4718/5875 women (80.3%) and 1157/5875 men (19.7%)). IgG antibodies were detected in 1363/5875 (23.1%, 95% CI 22.1%–24.3%), being significantly more prevalent in men (25.5%, 95% CI 23.4%–27.8%; $p < 0.01$) than in women (22.3%, 95% CI 21.1%–22.3%). The most affected HCW were Department Heads and Nursing Supervisors (30.0%, 95% CI 23.2%–37.5%), probably because of the high number of management meetings in the first weeks of the epidemic wave, followed by hospital porters (26.8%, 95% CI 22.5%–31.5%), residents (25.7%, 95% CI 21.6%–30.1%), nursing staff (24.2%, 95% CI 22.0%–26.5%) and physicians (23.7%, 95% CI 21.0%–26.7%) (Table 1).

Prevalence among non-sanitary professionals was 16.8% (95% CI 13.7%–20.7%). First-line specialties, such as pneumology, internal medicine, geriatrics, emergencies or infectious diseases, showed a prevalence of nearly 30%, but also second-line specialties, such as traumatology (36.5%), psychiatry (31.5%) or rheumatology (31.4%). On the other hand, prevalence was significantly lower (13.7% and 17.5%, respectively) in highly-exposed staff from anesthesiology and intensive care units, which could be related to a higher

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Table 1
Prevalence of IgG performed with ELISA (Vircell COVID-19 ELISA IgG test) by sex, professional categories and Departments

	n (%)	Prevalence IgG % (95% CI)	p value
Total	5875	23.2 (22.1–24.3)	
Sex			0.01
Women	4324 (80.3)	22.3 (21.1–23.6)	
Men	1155 (19.7)	25.5 (23.4–27.8)	
MacroCOVID			0.007
Yes (first line)	1920 (32.6)	24.8 (22.9–26.8)	
Yes (second line)	1235 (21.1)	24.8 (22.4–27.3)	
No	2720 (46.3)	21.3 (19.8–22.9)	
Professional category			0.000
Nursing staff	2476 (42.1)	24.2 (22.0–26.5)	
Physician	897 (15.3)	23.7 (21.0–26.7)	
Resident	428 (7.3)	25.7 (21.6–30.1)	
Hospital porter	388 (6.6)	26.8 (22.5–31.5)	
Researcher	296 (5.0)	24.0 (19.2–29.3)	
Technician	334 (5.7)	20.1 (15.9–24.8)	
Executive	14 (0.2)	14.3 (1.8–42.8)	
Department	170 (2.9)	30.0 (23.2–37.5)	
Head/Nursing Supervisor			
Administrative	481 (8.2)	13.7 (10.8–17.1)	
Other (non-health services)	391 (6.7)	20.7 (16.8–25.1)	
Department			
Allergy	36 (0.6)	22.2 (10.1–39.2)	
Anaesthesiology	117 (2.0)	13.7 (8.0–21.3)	
Cardiology	106 (1.8)	23.6 (15.9–32.8)	
Surgery	776 (13.2)	24.2 (21.3–27.4)	
Dermatology	35 (0.6)	17.1 (6.6–33.6)	
Endocrinology	82 (1.4)	29.3 (19.7–40.4)	
Pharmacy	88 (1.5)	11.4 (5.6–19.9)	
Physiotherapy	38 (0.7)	26.3 (13.4–43.1)	
Gastroenterology	91 (1.6)	29.7 (20.5–40.2)	
Geriatric	21 (0.4)	33.3 (14.6–57.0)	
Gynaecology	66 (1.1)	18.2 (9.8–29.6)	
Haematology	91 (1.6)	12.1 (6.2–20.6)	
Infectious Disease	117 (2.0)	28.2 (20.3–37.3)	
Laboratory	359 (6.1)	17.5 (13.8–21.9)	
Preventive medicine	22 (0.4)	9.1 (1.1–29.2)	
Administration/Services	1070 (18.2)	21.3 (18.9–23.9)	
Internal medicine	187 (3.2)	34.2 (27.5–41.5)	
Nephrology	111 (1.9)	10.8 (5.7–18.1)	
Pulmonology	72 (1.2)	38.9 (27.6–51.1)	
Neurophysiology	26 (0.4)	19.2 (6.6–39.4)	
Neurology	88 (1.5)	27.3 (18.3–37.8)	
Ophthalmology	86 (1.5)	17.4 (10.1–27.1)	
Oncology	126 (2.1)	29.4 (21.6–38.1)	
Otorhinolaryngology	40 (0.7)	5.0 (0.6–16.9)	
Paediatric	89 (1.5)	24.7 (16.2–35.0)	
Psychiatry	73 (1.2)	31.5 (21.1–43.4)	
Radiology	287 (4.9)	25.1 (20.2–30.5)	
Rehabilitation	31 (0.5)	19.4 (7.5–37.5)	
Rheumatology	35 (0.6)	31.4 (16.9–49.3)	
Occupational Health and Safety Service	14 (0.2)	64.3 (35.1–87.2)	
Traumatology	63 (1.1)	36.5 (24.7–49.6)	
Intensive care unit	194 (3.3)	17.5 (12.5–23.6)	
Emergency	301 (5.1)	31.9 (26.7–37.5)	
Urology	82 (1.4)	24.4 (15.6–35.1)	

perception of the risk and to extreme pre-emptive measures in their daily work.

Interestingly, 11.5% of IgG-positive HCW did not have any history of PCR testing, which could correspond to undiagnosed infections. Conversely, IgG was not detected in 6.1% of 411 HCW without a history of previous positive PCR result. Considering only HCW with positive IgM together with positive PCR post-serology and those

with positive seroconversion, we demonstrated current asymptomatic infections in 1.1% of HCW.

Using ELISA as the reference technique, the global agreement between both tests for IgG was 96.9% (κ index = 0.9) (sensitivity 93.5%, 95% CI 92.1%–94.8% and specificity 98.0%, 95% CI 97.6%–98.4%). Global agreement for IgM was 86.9% (κ index = 0.4), with a specificity of 98.2% (95% CI 97.8%–98.5%) but the sensitivity was extremely low 33.1% (95% CI 30.2%–36.1%), which made it unreliable for diagnosis of acute or asymptomatic cases.

Our results contrast with lower prevalences in HCW from other countries. Local variations in hospital settings had been reported but always in agreement with community incidence, also in contrast to our findings [3]. Community acquisition as well as transmission between staff members cannot be ruled out as shown by the high prevalence found in non-health professionals (20.7%). The higher prevalence found in men than women is also relevant, particularly considering that two-thirds of the HCWs of our institution are women. This difference in sex prevalence was not found in the national serosurvey [2]. We detected 1.1% of asymptomatic infections, which is relevant considering that the study was carried out when the positivity rate in our hospital was under 1% and infections in the community were in the base of the epidemic curve. Seroprevalence studies are crucial for assessing the impact of the pandemic and for evaluating control measures. The use of a rapid test, such as LFIA, could be a suitable tool for this purpose. Our results demonstrate a good agreement between LFIA and the reference technique for IgG detection.

In conclusion, infections in HCW could increase the worsening of the pandemic by collapsing health services. HCW could contribute as a source of transmission to other co-workers, patients and their own relatives and households.

Transparency declaration

The authors declare that they have no conflicts of interest.

Funding

The study was performed with the hospital's own resources.

Acknowledgements

We want to thank Laura del Campo Albendea for help with statistical analysis, Laura Martínez-García, Melanie Abreu and Magdalena Muedra for helping to carry out the study and data collection. Also to Mary Harper for English revision of the manuscript. We are deeply grateful to all laboratory technicians, administrative personnel and nurses who made this seroprevalence study possible.

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