Work place and prevalence of COVID-19 in a rural population in Greece

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ABSTRACT:

Introduction: Coronavirus disease-19 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become a global pandemic, giving rise to a serious global health threat. Many countries including Greece have seen a two-wave pattern of reported cases, with a first wave in spring and a second in autumn of 2020.

Methods: A cross-sectional seroprevalence study was designed to measure the prevalence of IgG antibodies with a quantitative SARS-CoV-2 IgG lab-based serology test, chemiluminescent microparticle immunoassay, against novel coronavirus in rural areas in Greece after the second pandemic wave. The study was conducted on 29 January 2021 in a rural semi-closed area, the municipality of Deskati, prefecture of western Macedonia in Greece after the second pandemic wave.

Results: Sixty-nine participants were included in this study. The present study demonstrated a high prevalence of COVID-19 infection (31 of 69 total participants; 45%) and those who were working in the public sector were at higher risk of COVID-19 infection in comparison to their counterparts in private sector (p=0.05364), (relative risk 2.64; 95% confidence interval 1.001–7.086).

Conclusion: The study presents data showing a high prevalence of herd immunity for COVID-19 in a semi-closed area in Greece. These findings might help to understand the characteristics of this second wave, the behaviour and danger of SARS-CoV-2 in rural areas in Greece and Europe generally.

Keywords:

COVID-19, Greece, rural population, SARS-CoV-2, seroprevalence study, workplace

FULL ARTICLE:

Introduction

Coronavirus disease-19 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), impacts on workers and workplaces across the world have been dramatic; furthermore, the recent pandemic is both a global health crisis and an international economic threat[1].

The disease, which appeared in Wuhan, China, in December 2019, quickly spread across continents and was declared a pandemic by WHO on 11 March 2020[2]. As of 5 March 2021, COVID-19 had infected over 113 472 187 people and caused over 2 520 653 deaths globally[3].

In the first wave of the pandemic in spring and summer of 2020, Greece had reported a small number of laboratory-confirmed cases of COVID infection in the general population and a small number of related deaths also.

Differences in age range and severity of the disease and the total number of deaths have been reported, in the comparative characteristics of the two waves. Official data from the Greek National Public Health Organization (EODY) show that the second wave of pandemic began early in October 2020 and dramatically rose during November 2020, with high morbidity and mortality rates[4,5]. Since the emergence of COVID-19 in December 2019, there has been a critical need to understand the prevalence of antibodies in the general population especially, after one year of the pandemic.

The aim of this study was to evaluate prevalence of SARS-CoV-2 infection based on diagnosis of IgG antibodies from blood serum in an observational descriptive cohort study in a semi-closed rural area of Greece.

Methods

A cross-sectional seroprevalence study was designed to measure the prevalence of IgG antibodies against novel coronavirus in rural areas in Greece after the second pandemic wave. A surveillance program was conducted by the municipality of Deskati on 29 January 2021 with the University of Thessaly. The residents of Deskati were invited to participate in the study. According to the Hellenic Statistical Authority the total population of the municipal of Deskati was 3598 residents.

In this study, we used a quantitative SARS-CoV-2 IgG lab-based serology test, chemiluminescent microparticle immunoassay (Abbot, ARCHITECT I System; https://www.corelaboratory.abbott/int/en/offerings/segments/infectious-disease/sars-cov-2). The sensitivity of the method is 99.9% and specificity 100% for detecting the IgG antibody, a positive predicted value of 92.11% (95% confidence interval (CI) 85.87–95.73) and a negative predicted value of 99.97% (95%CI 99.76–100.00). Three hundred and ninety civilians participated and were examined for antigens of SARS-CoV-2 with a sample rapid test (nasopharyngeal/oropharyngeal exudate). The participants were also invited to participate voluntarily with blood serum for IgG antibodies against SARS-CoV-2, and 69 of them responded to the invitation.

Ethics approval

The Ethics Committee of the University Hospital of Larissa approved the study (protocol number 2800-01/11/2020) and all the participants provided written informed consent.

Results

The present study recorded a high prevalence of COVID-19 infection among the 69 participants. Thirty-one of these (45%) were found to be positive for SARS-CoV-2 IgG antibodies. Nineteen of the positive participants were male and 12 were female (p=0.07901). Of the 31 seropositive participants, 29 reported that they didn't have any known close contact with

COVID-19 patients (*p*=0.5088). Logistic regression analysis showed that the participants working in the public sector were at higher risk of COVID-19 infection in comparison to their counterparts in the private sector (*p*=0.05364), (relative risk 2.64; 95%CI 1.001–7.086) (Tables 1, 2).

Table 1: Characteristics of study participants (*n*=69)

Characteristic	*n* (%)	Mean±SD
Male	34 (49.2)	–
Female	35 (50.8)	–
Age		
Overall	–	52.7±14.48
COVID positive	–	51.67±14.48
COVID negative	–	54.52±14.58
BMI		
Overall	–	32.27±4.89
COVID positive	–	30.95±4.89
COVID negative	–	33.27±4.98

BMI, body mass index. SD, standard deviation

Table 2: SARS-CoV-2 IgG antibody prevalence, municipality of Deskati, Greece (*n*=69)

Characteristic	*n*	%	*n*	%	*p*-value/CI	RR
	IgG positive		IgG negative			
Antibody IgG, prevalence	31/69	45	38/69	55	(0.9051–6.523)	
Male	19/31	62	15/38	40		
Female	12/31	38	23/38	60		
Smoking status					0.8042 (0.4279–2.988)	
Non-smoker	17/31	54.8	22/38	57.9		
Current smoker	5/31	16.2	9/38	23.6		
Ex-smoker	9/31	29	7/38	18.5		
Close contact with COVID-positive	2/31	6.5	1/38	2.6	(0.1839–77.15)	
No close contact with COVID-positive	29/31	93.5	37/38	97.4		
Comorbidities	9/31		13/38		(0.2739–2.221)	
Police	3/31	9.6	–	–	0.05364 (0.9852–7.195)	2.64
Public sector	3/31	9.6	8/38	21.3		
Education	7/31	22.5	1/38	2.6		
Student	2/31	6.6	1/38	2.6		
Health sector	4/31	13.0	3/38	7.9		
Coffee shop	2/31	6.6	–	–		
Farmer	3/31	9.6	7/38	18.4		
Private sector	4/31	12.9	6/38	15.7		
Retired	3/31	9.6	9/38	23.6		
Unemployed	–	–	3/38	7.9		
Public sector	18/31	58%	13/38	42%		
Private sector	13/38	34%	25/38	66%		

BMI, body mass index. CI, confidence interval. RR, xxx. SD, standard deviation.

Discussion

This study aimed to evaluate the prevalence of SARS-CoV-2 infection based on the prevalence of anti-SARS-CoV-2 IgG antibodies in an observational descriptive cohort study in the semi-closed rural area of Deskati, dated at the end of the second pandemic wave. According to Maltezou et al and data retrieved from the national database of SARS-CoV-2 infections, early measures kept the first pandemic wave in Greece at a relatively low scale[6]. Because the incidence of diagnosed cases increased in the second wave of the COVID-19 pandemic, it is important to understand the degree to which employment in the essential service sectors (public and private) represents the risk of infection. It is also important to note that workplace outbreaks represent COVID-19 cases where transmission likely occurred at the workplace. The reported morbidity and mortality of COVID-19 during the second wave of the pandemic, which started in October 2020, in Greece were among the highest in Europe, with many deaths and regions with increased incidence of COVID-19[7].

Our study presents high seroprevalence of SARS-CoV-2 in the municipality of Deskati, Greece (45%) for a semi-closed rural population after two waves of the COVID-19 pandemic. The high seroprevalance level supported by the morbidity and mortality

numbers was announced by the National Public Health Organization and evident in the global data[8]. This is in contrast to previous studies in Greece demonstrating low seroprevalence levels in the general population[7] and the health professions population[9].

A second important finding of the present study is the statistically significant difference between public sector employees compared to their private sector counterparts, in contrast with a study from Peru where healthcare workers in the private sector had a higher turnover intention than those in the public sector[10].

One of the sectors that has been the most affected since the onset of the health emergency has been pre-primary, primary and secondary education. Education has taken centre stage with the demand for students to continue to be schooled. In the analysis of the cases from the public sector, we found that the majority (9/31, 29%) were teachers and students. Data from Canada reported increased cases in education settings in Ontario since the previous September, with 70% of these among students, 15% among staff and 15% not specified. Over this same time period (September–December 2020), 2227 COVID-19 cases were attributed to outbreaks in education settings[11].

The findings of the present study seem to support the hypothesis that personal hygiene and protection measures and physical distancing restrictions were not followed and that the level of knowledge of the community about COVID-19 remained low. In addition, a number of factors may have contributed to enhancing the risk of infection with SARS-CoV-2 in the municipality of Deskati in the second pandemic wave. The participants in the personal phone interview after the results of the present study reported that the universal use of face masks was discouraged for the residents of Deskati after the low incidence of COVID -19 in Greece in the first pandemic wave. A probable factor in the high prevalence of COVID-19 in participants in the public education sector were the ceremonies organised in these facilities for the annual national celebration day on 28 October. The vast majority of the patients reported that they did not have known close contact with a person with symptoms of COVID-19. That enhanced our hypothesis for lack of personal hygiene measures.

The present study has several limitations. The small number of participants is not representative of the general population. Our data were collected in a small municipality in a rural area of Greece, and cannot be generalised to other areas of the country. Another bias of the present study could be that as the blood test was voluntary, only people who were worried that they had COVID-19 would consent to a blood test, hence the prevalence may appear higher. In addition, a significant limitation of this study was the small number of participants solely from the community of Deskati; to achieve accurate results from seroprevalence studies recruiting a representative sample of the population of interest is important.

Conclusion

The present study presents data with high prevalence for COVID-19 in a rural area in Greece and was conducted at the end of the second pandemic wave. Our findings report increased prevalence of COVID-19 infection in the public sector and especially in primary education settings. Our results might help to understand the characteristics of this second wave and the behaviour and danger of SARS-CoV-2 in rural areas in Greece and Europe generally. Further studies are needed to confirm our findings.

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REFERENCES:

1 Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, et al. The socio-economic implications of the coronavirus pandemic (COVID-19): a review. *International Journal of Surgery* 2020; **78:** 185-193. DOI link, PMid:32305533

2 World Health Organization. *WHO announces COVID-19 outbreak a pandemic.* Available: web link (Accessed 24 June 2022).

3 World Health Organization. *Coronavirus disease (COVID-2019) situation reports.* Available: web link (Accessed 24 June 2022).

4 Greek ECDC. *Daily surveillance report of COVID-19 (12/02/2021).* Available: web link (Accessed 24 June 2022).

5 Greek ECDC. *Daily surveillance report of COVID-19 (30/11/2020).* Available: web link (Accessed 24 June 2022).

6 Maltezou HC, Papadima K, Gkolfinopoulou K, Ferentinos G, Mouratidou E, Andreopoulou A, et al. Coronavirus disease 2019 pandemic in Greece, February 26 – May 3, 2020: the first wave. *Travel Medicine and Infectious Disease* 2021; **41:** 102051. DOI link, PMid:33819570

7 Bogogiannidou Z, Vontas A, Dadouli K, Kyritsi MA, Soteriades S, Nikoulis DJ, et al. Repeated leftover serosurvey of SARS-CoV-2 IgG antibodies, Greece, March and April 2020. *Eurosurveillance* 2020; **25:** 31. DOI link, PMid:32762796

8 Our World in Data. *Greece: coronavirus pandemic country profile.* 2020. Available: web link (Accessed 24 June 2022).

9 Psichogiou M, Karabinis A, Pavlopoulou ID, Basoulis D, Petsios K, Roussos S, et al. Antibodies against SARS-CoV-2 among health care workers in a country with low burden of COVID-19. *PLoS One* 2020; **15(12):** e0243025. DOI link, PMid:33270691

10 Yáñez JA, Jahanshahi AA, Alvarez-Risco A, Li J, Zhang SX. Anxiety, distress, and turnover intention of healthcare workers in Peru by their distance to the epicenter during the COVID-19 crisis. *American Journal of Tropical Medicine and Hygiene* 2020; **103(4):** 1614-1620. DOI link, PMid:32815512

11 Institute for Work & Health. *Incidence of COVID-19 transmission in Ontario workplaces.* Available: web link (Accessed 24 June 2022).