Outcomes of hospitalized COVID-19 patients belonging to ethnic/racial minorities in Greece

Michaella Alexandrou[1,2], Stavroula Daskalopoulou[1,3], Anna-Louiza Haliassou[1,4], Eleftheria Kranidioti[1,5], Evangelia Margellou[1,6], Andreas Panagopoulos[1,5], Eleni Papageorgiou[1,6], Artemis Rodopoulou[1], Georgia Stavropoulou[1,7], Apostolos Pappas[1,6], Ioannis Kalomenidis[1,6]

ABSTRACT

INTRODUCTION Research suggests that racial minorities are overrepresented in the number of COVID-19 related deaths compared to people of White origin. This is the first study to assess racial differences in the clinical characteristics and outcomes of COVID-19 positive patients, hospitalized in Greece.

METHODS This retrospective, cross-sectional study included 628 COVID-19 hospitalized patients, from 10 September to 31 December 2020. We compared data concerning gender, age, comorbidities and outcome, between patients of European and non-European origin. Moreover, we applied logistic regression in which the outcome, in our case in-hospital death, was assessed with race, age, sex, and Charlson Comorbidity Index (CCI) score.

RESULTS In the first and unadjusted race-only logistic regression model, non-Europeans (OR=0.057; 95% CI: 0.008–0.411, p=0.005) were less likely than European patients to die in the hospital. However, controlling for sex, age and CCI score resulted in non-significant differences.

CONCLUSIONS There are a lot of statistically significant differences between European and non-European COVID-19 hospitalized patients regarding their clinical characteristics, with the second presenting a lower hospital mortality rate, but after adjusting for age, sex and CCI score, race seems to be not significant.

AFFILIATION

1 COVID-19 Unit, National and Kapodistrian University of Athens, School of Medicine, Evangelismos Hospital, Athens, Greece
2 1st Department of Critical Care and Pulmonary Medicine, National and Kapodistrian University of Athens, School of Medicine, Evangelismos Hospital, Athens, Greece
3 5th Department of Internal Medicine, National and Kapodistrian University of Athens, School of Medicine, Evangelismos Hospital, Athens, Greece
4 4th Department of Internal Medicine, National and Kapodistrian University of Athens, School of Medicine, Evangelismos Hospital, Athens, Greece
5 3rd Department of Internal Medicine, National and Kapodistrian University of Athens, School of Medicine, Evangelismos Hospital, Athens, Greece
6 1st Department of Internal Medicine, National and Kapodistrian University of Athens, School of Medicine, Evangelismos Hospital, Athens, Greece
7 Department of Neurology, National and Kapodistrian University of Athens, School of Medicine, Evangelismos Hospital, Athens, Greece

CORRESPONDENCE TO

Michaella Alexandrou. COVID-19 Unit, National and Kapodistrian University of Athens, School of Medicine, Evangelismos Hospital, Ipsilantou 45-47, 10676, Athens, Greece. E-mail: alexmichaella@yahoo.gr
ORCID ID: https://orcid.org/0000-0002-9549-0748

KEYWORDS

Greece, race, immigrants, COVID-19, SARS-CoV-2, mortality

Received: 29 April 2022
Revised: 6 September 2022
Accepted: 15 September 2022

INTRODUCTION

Since the beginning of the COVID-19 pandemic, emerging evidence from the US and the UK has revealed significant disparities between people belonging to ethnic/racial minorities and those of White race, with the first being at higher risk of infection, severe disease and adverse outcomes[1-4]. Additionally, several studies have shown that COVID-19 affects disproportionally the migrant population[4,5], although relevant research is still limited. So far, the impact of SARS-CoV-2 infection has not been investigated in people belonging to ethnic/racial minorities in Greece. Thus, we aimed to explore the outcomes of COVID-19 patients hospitalized in a large Greek General Hospital according to their racial/ethnic origin. We hypothesized that patients

Pneumon 2022;35(4):25
https://doi.org/10.18332/pne/154601

of European origin would present lower mortality rates compared to those of African/Asian origin.

METHODS

This retrospective study included 628 patients admitted in the COVID-19-dedicated unit (common isolation wards) of Evangelismos General Hospital, between 10 September and 31 December 2020. Data were retrieved from patients' medical records. Patients were classified as being either of European origin or African/Asian origin. The reasons why we divided our population into these two groups are described below: Greece in the early 1990s and 2000s became a migrant-hosting country for mainly other Balkan countries, like Albania, Romania and Bulgaria, and some European states of the former Soviet Union[6]. The most recent migration flows to Greece have been mainly from the Middle East, central Asia and different parts of Africa[7,8]. As immigrants' health tends to converge with the local population over time[9], our study focuses on the comparison of two groups, Europeans (either born in Greece or other countries) and non-Europeans, which in our case are patients of African/Asian origin and who represent the vast majority of the recent immigrant flows. Patients were treated according to the national and international guidelines which were progressively developing during the period of the study.

We compared data concerning gender, age, comorbidities and outcome between patients of European and non-European origin. Continuous variables are presented as medians with IQR, and were evaluated with Mann-Whitney U-test, while contingent analysis was performed using Fisher's exact test. Moreover, we performed a univariate analysis with the race being the independent variable and in-hospital mortality being the dependent. In-hospital mortality was assessed against race using a multiple logistic regression model including gender and the Charlson Comorbidity Index (CCI) score, as additional co-variates. All analyses used the SPSS version 23.0 (IBM SPSS, IBM Corp., Armonk, NY, USA).

RESULTS

A total of 628 hospitalized patients, with a positive QT-RT-PCR nasopharyngeal swab test for SARS-CoV-2, with a median (IQR) age of 59 years (range: 28–73), were included in the study (Table 1). Among them, 84% were of European origin. Compared with Europeans, non-Europeans were younger (p<0.001), with a greater proportion of males (p<0.001) and never smokers (p=0.001). In terms of comorbidities, fewer non-Europeans were obese (p<0.001), had hypertension (p=0.001) and cancer (p=0.041), but more were suffering from chronic liver disease (p=0.021). In addition, the median CCI score was 2 (range: 1–4) for Europeans, which was significantly higher (p<0.001) compared with non-Europeans, which was 1 (range: 0–1.75). On admission, Europeans had more advanced disease, as defined by the 2022 WHO criteria[10], than non-Europeans. Compared with non-Europeans, more Europeans received remdesivir (38.3% vs 20%, p<0.001) or corticosteroids

Table 1. Demographic and clinical characteristics and outcomes of patients hospitalized for COVID-19 (N=628)

Characteristics	Europeans (n=528) n (%)	Non-Europeans (n=100) n (%)	All (n=628) n (%)	p
Age (years), median (IQR)	62 (52–76)	44 (34–52)	59 (48–73)	**<0.001**
Gender				**<0.001**
Male	297 (56.3)	75 (75.0)	372 (59.2)	
Female	231 (43.8)	25 (25.0)	256 (40.8)	
Smoking status				**0.002**
Current	60 (11.4)	5 (5.0)	65 (10.4)	
Former	91 (17.2)	7 (7.0)	98 (15.6)	
Never	377 (71.4)	88 (88.0)	465 (74.0)	
Comorbidities				
Hypertension	198 (37.5)	20 (20.0)	218 (34.7)	**0.001**
CAD	69 (13.1)	7 (7.0)	76 (12.1)	0.088
Obesity (BMI >30 kg/m^2)	100 (18.9)	5 (5.0)	105 (16.7)	**0.001**
Asthma	21 (4.0)	6 (6.0)	27 (4.3)	0.416
COPD	20 (3.8)	0 (0)	20 (3.2)	0.057
Diabetes	96 (18.2)	27 (27.0)	123 (19.6)	**0.042**
Cancer	40 (7.6)	2 (2.0)	42 (6.7)	**0.041**

Continued

Table 1. Continued

Characteristics	Europeans (n=528) n (%)	Non-Europeans (n=100) n (%)	All (n=628) n (%)	p
CVD	26 (4.9)	2 (2.0)	28 (4.5)	0.289
Immunosuppression	35 (6.6)	3 (3.0)	38 (6.1)	0.163
CKD	28 (5.3)	5 (5.0)	33 (5.3)	0.901
Chronic liver disease	9 (1.7)	6 (6.0)	15 (2.4)	**0.021**
Autoimmune disease	37 (7.0)	2 (2.0)	39 (6.2)	0.057
CCI, median (IQR)	2 (1–4)	1 (0–1.75)	2 (1–4)	**<0.001**
WHO score on admission				**0.025**
Non-severe	393 (74.4)	87 (87.0)	480 (76.4)	
Severe	122 (23.1)	12 (12.0)	134 (21.3)	
Critical	13 (2.5)	1 (1.0)	14 (2.2)	
Intubation	64 (12.1)	3 (3.0)	67 (10.7)	**0.007**
ICU admission	89 (16.9)	4 (4.0)	93 (14.8)	**0.001**
In hospital mortality	80 (15.2)	1 (1.0)	81 (12.9)	**<0.001**

Bold values indicate statistical significance (p<0.05). BMI: body mass index. COPD: chronic obstructive pulmonary disease. CVD: cerebral vascular disease. CKD: chronic kidney disease. CAD: coronary artery disease. IQR: interquartile range. CCI: Charlson Comorbidity Index. WHO: World Health Organization. ICU: intensive care unit.

(51.5% vs 26%, p<0.001), which more likely reflect differences in disease severity. By the end of the study, immune-modulating agents were not recommended as routine treatment for severe and critical disease. Therefore, only two patients of European origin were given tocilizumab. Compared to Europeans, a lower ICU admission (p=0.001), intubation (p=0.007) and mortality (p<0.001) rate was observed in the non-Europeans.

In the unadjusted race-only logistic regression model, non-Europeans were less likely than European patients to die in the hospital (OR=0.057; 95% CI: 0.008–0.411, p=0.005). However, using a logistic regression analysis adjusted for sex (OR=0.533; 95% CI: 0.297–0.956, p=0.035), age (OR=1.068; 95% CI: 1.039–1.097, p<0.001) and CCI score (OR=1.328; 95% CI: 1.040–1.098, p<0.001), we could not find significant differences in the death rate between Europeans and patients of other racial/ethnic groups (OR=0.492; 95% CI: 0.062– 3.930, p=0.503).

DISCUSSION

This study examined the clinical characteristics and outcomes of 628 hospitalized COVID-19 patients, according to their ethnic/racial origin. Europeans were older with a larger proportion of female patients, compared to non-Europeans. Additionally, they had a heavier burden of comorbidities (except chronic liver disease which was more common among the African/Asian) and on admission, they had more advanced disease. More Europeans than non-Europeans received remdesivir and dexamethasone, which more likely reflects the differences in disease severity between the two groups. Non-Europeans presented a lower in-hospital mortality rate, but after adjusting for age, gender and CCI score, the ethnic origin did not seem to be associated with the patients' outcome.

To the authors' best knowledge, this is the first study to assess ethnic/racial differences in the clinical characteristics and outcomes of hospitalized COVID-19 patients, in a Greek General Hospital, demonstrating that patients of African/Asian origin had excellent outcomes. This observation may be explained by the well-documented 'healthy immigrant effect'[11]; immigrants often report better health status compared to local individuals, as they are young and healthy on arrival. In general, non-Europeans were younger with a better co-morbidity profile. Thus, a more meaningful comparison had to eliminate the possibility that the differences in the COVID-19 outcomes were a result of the differences in the population composition, since older age and comorbidities have been linked to a higher COVID-19 mortality[12]. Evaluation of age, gender and CCI as co-variates revealed no significant differences in mortality. Similarly, while early observations in the US showed increased mortality among African-Americans or Hispanics, compared to Caucasians, this observation was later attributed to increased infection rate rather than worse disease outcomes[13,14]. In agreement with our findings, others have reported no effect of being of ethnic/racial origin in hospitalized COVID-19-patient outcomes, when accounting for base-line patients' characteristics[14-17].

CONCLUSIONS

Asian and African immigrants with SARS-CoV-2 infection, hospitalized in a General Greek hospital during autumn, had similar mortality rates as patients of European origin (local or immigrant). Older age, male gender and higher Charlson Comorbidity Index were independent risk factors of in-hospital mortality.

CONFLICTS OF INTEREST

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

FUNDING

There was no source of funding for this research.

ETHICAL APPROVAL AND INFORMED CONSENT

The study was approved by the Ethics Committee of the Evangelismos Hospital, (Protocol number: 380; Date: 26 August 2021). Informed consent was not required due to the retrospective design of the study.

DATA AVAILABILITY

The data supporting this research are available from the corresponding author on reasonable request.

AUTHORS' CONTRIBUTIONS

MA contributed to the data collection, conducted the statistical analysis and wrote the first draft. AR, ALH, AP, EK, GS, EM, SD and EP contributed to different parts of data collection and reviewed and approved the article. IK conceived the idea, designed the study, overviewed the data collection and critically contributed in writing and reviewing the manuscript.

PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed.

REFERENCES

1. Wiley Z, Ross-Driscoll K, Wang Z, et al. Racial and Ethnic Differences and Clinical Outcomes of COVID-19 Patients Presenting to the Emergency Department. Clin Infect Dis. 2022;74(3):387-394. doi:10.1093/cid/ciab290
2. Dorn A, Cooney R, Sabin M. COVID-19 exacerbating inequalities in the US. Lancet. 2020;395(10232):1243-1244. doi:10.1016/S0140-6736(20)30893-X
3. Bibbins-Domingo K. This Time Must Be Different: Disparities During the COVID-19 Pandemic. Ann Intern Med. 2020;173(3):233-234. doi:10.7326/M20-2247
4. Gray D, Anyane-Yeboa A, BaLzora S, Issaka R, May F. COVID-19 and the other pandemic: populations made vulnerable by systemic inequity. Nat Rev Gastroenterol Hepatol. 2020;17(9):520-522. doi:10.1038/s41575-020-0330-8
5. Vanthomme K, Gadeyne S, Lusyne P, Vandenheede H. A population-based study on mortality among Belgian immigrants during the first COVID-19 wave in Belgium. Can demographic and socioeconomic indicators explain differential mortality? SSM Popul Health. 2021;14:100797. doi:10.1016/j.ssmph.2021.100797
6. Cavounidis J. Migration in Southern Europe and the Case of Greece. Int Migr. 2002;40(1):45-70. doi:10.1111/1468-2435.00185
7. Cavounidis J. The migration exprerience of Greece and the impact of the economic crisis on its migrant and native populations. Eur. J. Public Health. 2018;28(Suppl 5):20-23. doi:10.1093/eurpub/cky204
8. Eikemo T, Avrami L, Cavounidis J, et al. Health in crises. Migration, Austerity and Inequalities in Greece and Europe: Introduction to the Supplement. Eur. J. Public Health. 2018;28(Suppl 5):1-4. doi:10.1093/eurpub/cky223
9. Antecol H, Bedard K. Unhealthy assimilation: Why do immigrants converge to american health status levels? Demography. 2006;43(2):337-360. doi:10.1353/dem.2006.0011
10. World Health Organization. Clinical management of COVID-19: Living guideline, 23 June 2022. Updated September 15, 2022. Accessed September 20, 2022. https://www.who.int/publications/i/item/WHO-2019-nCoV-clinical-2022-1
11. Kennedy S. The Healthy Immigrant Effect: Patterns and Evidence from Four Countries. J Int Migr Integr. 2015;16(2):317-332. doi:10.1007/s12134-014-0340-x
12. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet. 2020;395(10229):1038. doi:10.1016/S0140-6736(20)30566-3
13. Sze S, Pan D, Nevill C, et al. Ethnicity and clinical outcomes in COVID-19: A systematic review and meta-analysis. EClinical Medicine. 2020;100630. doi:10.1101/2020.09.05.20188821
14. Munõz-Price S, Nattinger A, Riviera F, et al. Racial Disparities in Incidence and Outcomes among Patients with COVID-19. JAMA Network Open. 2020;3(9):e2021892. doi:10.1001/jamanetworkopen.2020.21892
15. Yehia BR, Winegar A, Fogel R, et al. Association of Race With Mortality Among Patients Hospitalized With Coronavirus Disease 2019 (COVID-19) at 92 US Hospitals. JAMA Network Open. 2020;3(8):e2018039. doi:10.1001/jamanetworkopen.2020.18039
16. Gu T, Mack J, Salvatore M, et al. Characteristics Associated with Racial/Ethnic Disparities in COVID-19 Outcomes in an Academic Health Care System. JAMA Network Open. 2021;3(10):1-15. doi:10.1001/jamanetworkopen.2020.25197
17. Price-Haywood E, Burton J, Fort D, Seoane L. Hospitalization and Mortality among Black Patients and White Patients with Covid-19. N Engl J Med. 2020;382(26):2534-2543. doi:10.1056/NEJMsa2011686