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.

Perspectives about COVID-19 among obese African Americans hospitalized during the pandemic

Evelyn Gathecha, Thang Nguyen, Regina Kauffman, Scott M. Wright, Ché Matthew Harris

Acknowledgements: Scott Wright, MD receives support as the Anne Gaines and G. Thomas Miller Professor of Medicine through the Johns Hopkins Center for Innovative Medicine.

Author affiliations: Evelyn Gathecha; Thang Nguyen; Regina Kauffman; Scott M. Wright; Ché Matthew Harris

Corresponding author.email: egathec1@jhmi.edu

https://doi.org/10.1016/j.jnma.2022.02.014

1. INTRODUCTION

The coronavirus disease of 2019 (COVID-19) that is responsible for over 212 million cases and over 4.4 million deaths world-wide was shown to have disproportionately impacted African American communities in the United States (US).[1,2] In this pandemic, patients that tested positive for Severe Acute Respiratory Syndrome from Coronavirus 2 (SARS-CoV2) who had at least one of the 5 most common chronic conditions (hypertension, cardiovascular disease, chronic kidney disease, diabetes mellitus or increased body mass index [BMI]) were found to be at higher risk of death.[3,4] Further, patients from minority groups – especially those with greater social vulnerability and poor health care access - had disproportionately worse clinical outcomes, including death.[5–11]

Several reports have also shown that obese patients are at higher risk of more severe COVID 19 infection, a greater chance of hospitalization, and increased mortality.[12–16] Obese patients hospitalized with SARS-CoV2 are also more likely to need to be admitted to the ICU.[2]

Although African Americans with obesity are disproportionately affected by the pandemic, little is known of their knowledge and attitudes related to the COVID-19 pandemic. To understand more about this, we conducted this study to assess COVID-19 perceptions among hospitalized African Americans with comparisons made between those with and without obesity.

2. METHODS

2.1. Participants and setting

This study enrolled hospitalized patients admitted to the general medicine wards at a tertiary care university-affiliated hospital in Baltimore between November 10, 2020 and March 10, 2021. Re-admitted patients who were previously encountered during the study period were not approached again to enter the study. Study inclusion criteria included hospitalized Black patients without a previous or current history of COVID-19, age $\geq$ 18 years and English speaking. The study excluded patients with a past history or current infection with COVID-19, altered mental status, dementia, and those lacking capacity to make medical decisions. We also excluded patients who were hard of hearing, unable to verbally express themselves, and those who could not understand the purpose of the study. A total of 526 admitted patients were screened during the study period. Ninety-two patients either had a past or current COVID-19 infection, 109 had altered mental status or dementia, and 10 had communication barriers (difficulty in hearing or verbal expression). The remaining 315 patients were eligible for participation. Among eligible patients, 70 were discharged prior to being approached, and 105 refused to participate. There were no gender or age differences between participants and those who were discharged or refused to participate;(age and gender both with $p > 0.05$). A total of 140 patients made up the final study cohort.

2.2. Survey instrument

The survey was developed by hospital-based clinicians and researchers who cared for patients with COVID-19. The study team has extensive expertise in survey design. The instrument was informed by our prior inpatient studies,[17] a review of the literature, meetings with larger teams at 'research in progress' sessions across different divisions, and lengthy discussions with more than 10 hospitalized patients with and without COVID-19 infections during the pandemic; these steps conferred content validity

evidence to the instrument. The survey was initially piloted in November 2020 with 8 patients that met eligibility criteria. These patients explained how they were interpreting each question; this process rendered response process validity evidence to the instrument. Based on respondent feedback, the survey was further modified before it was officially launched.

During the data collection period, the study team reviewed patients admitted to the general medicine wards between Monday and Friday to identify participants. For patients deemed eligible, most were approached at bedside by a member of the study team and some received a telephone call to their room. If patients were not available, they were typically re-visited the next hospital day. The study was approved by the hospital's Institutional Review Board IRB0024989.

2.3. Measures

The main outcome measures assessed patient knowledge and perceptions about COVID-19. Multiple choice options and "Yes/No" responses were used. Some examples of questions/statements included the following: "COVID-19 originated from China" ("Yes"/ "No"), "How many Americans have been infected with COVID-19? (Thousands, Hundreds of thousands, Millions), and "What percentage of people who are infected with COVID-19 die?" (<=15%, 16–30%, >30%). For attitudinal questions, standard Likert scale response options were used (Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree). Example statements included: "I know a lot about COVID-19", "The African American community has been the hardest by the pandemic", and "I, myself, am at high risk for getting COVID-19".

Patient demographics collected included age, sex, education, employment status, and estimated median income based on zip code. The diagnoses precipitating the incident hospitalizations were also recorded, as were several of the comorbidities believed to be associated worse clinical outcomes in the setting of COVID-19 infection.

2.4. Statistical analyses

Patient responses to some of the questions were dichotomized; for example, the Likert-scale responses were collapsed into affirmations ("Strongly Agree" and "Agree") compared to all other options.

The study compared enrolled patients with body mass index (BMI) $\geq$ 30 kg/m^2 to those with a BMI <30 kg/m^2. Patient BMI was calculated by the nursing team at the time of admission on the general medicine wards. Patients who were able to stand were weighed with a standing bedside scale. Patient unable to stand were weighed using the hospital bed scale. Heights were assessed with tape measures, and BMI calculated by dividing patient weight in kg by their height in meters squared. The Centers for Disease Control and Prevention classifies obesity as a BMI $\geq$ 30 kg/m^2.[18] Sixty-nine patient had a BMI $\geq$ 30 kg/m^2 and 71 patients had a BMI <30 kg/m^2.

Comparisons were made between patients with and without obesity using Fisher's exact tests and t-tests for categorical and continuous variables, respectively. We used Stata 15.0 statistical software (Stata Corp, College Station, TX), and the p-values for this study were 2 sided and type I error significance level at $\leq$0.05.

3. RESULTS AND DISCUSSION

3.1. Results

Table 1 shows comparisons of demographics, reasons for admission, and comorbidities between Black patients with and without obesity. The groups were similar in terms of age (p 0.33). More patients with obesity were female compared to those without obesity (69.5% vs 39.4%; p <0.01). Among additional COVID-19 related comorbidities, patients with obesity were more likely to have asthma (34.7% vs 17.1%; $p = 0.02$), dyslipidemia (44.9% vs 26.7%; $p = 0.03$), and hypertension (82.6% vs 66.1%; $p = 0.03$).

The majority of patients with and without obesity thought they knew a lot about of COVID-19 (62.3% vs 59.1%; $p = 0.73$), thought the virus originated in China (73.9% vs 71.8%, $p = 0.85$), and believed that millions of Americans had been infected with the virus (55.0% vs 66.1%; $p = 0.27$), Table 2. There was not a significant difference between groups in the overestimation that 50% or more of people infected with COVID-19 required hospitalization (46.3% vs 53.5%, $p = 0.49$). However, patients with obesity were more accurate in their assessment that a lower percentage of people infected with COVID-19 die from the virus (31.8% vs 21.1%, $p = 0.04$).

The vast majority of patients with and without obesity believed the virus was easily transmitted (88.4% vs 88.7%, $p = 1.0$). More obese patients, as opposed to those without, thought they were at higher risk of infection from the virus – although the difference was not statistically significant (75.3% vs. 66.1%, $p = 0.26$). Further, patients with obesity were more likely to report having been tested prior to the current hospitalization (76.8% vs 57.7%; $p = 0.02$). Ultimately, there were no differences in patient receptivity to vaccinations between obese and non-obese participants. (63.7% vs. 64.3%; $p = 1.0$).

Across the groups, there were no differences in their reported sense of wellbeing during the pandemic with most

Table 1. Baseline demographic and clinical characteristics of 140 hospitalized Black patients who shared perspectives about COVID-19.

	Patients with obesity $N = 69$	Patients without obesity $N = 71$	*p*-value
Age in years, mean ± SE	55.6 ± 1.6	58.0± 1.9	0.33
Female, n (%)	48 (69.5)	28 (39.4)	<0.01
BMI (kg/m^2), mean ± SE	38.5 ± 0.8	24.5± 0.4	<0.01
Completed high school/GED, n (%)	57 (82.6)	56 (78.8)	0.67
Employment Status, n (%)			0.9
Unemployed	7 (10.1)	8 (11.2)	
Employed	25 (36.2)	24 (33.8)	
Disability	18 (26.0)	20 (28.1)	
Retired	18 (26.0)	19 (26.7)	
Not specified	1 (1.4)	0 (0.0)	
Median Income based on zip code [in US$], n (%)			0.18
$1-$32,667	18 (26.0)	20 (28.1)	
$32,667 - $44,025	21 (30.4)	18 (25.3)	
$44,025 - $49,444	17 (24.6)	10 (14.0)	
$49,444 - $90,365	13 (18.8)	23 (32.3)	
Top reasons for admission, n (%)			
*Cardiac	15 (21.7)	19 (26.7)	0.43
**Gastrointestinal	13 (18.8)	13 (18.3)	0.96
Syncope/Fall	10 (14.4)	10 (14.0)	0.97
χ Pulmonary	12 (17.3)	8 (11.2)	0.31
Cellulitis	4 (5.7)	4 (5.6)	0.98
Renal	2 (2.8)	6 (8.4)	0.14
Comorbidities, n (%)			
Hypertension	57 (82.6)	47 (66.1)	0.03
Tobacco use	37 (53.6)	41(57.7)	0.73
Asthma	24 (34.7)	12 (17.1)	0.02
Type II Diabetes Mellitus	22 (31.8)	14 (19.7)	0.12
Dyslipidemia	31 (44.9)	19 (26.7)	0.03
Congestive Heart Failure	20 (28.9)	15 (21.2)	0.33
Depression	18 (26.0)	26 (36.6)	0.27
Chronic Kidney Disease (All Stages)	17 (24.6)	20 (28.1)	0.70
Coronary Artery Disease	16 (23.1)	16 (22.5)	1.0
Chronic Obstructive Pulmonary Disease	14 (20.2)	10 (14.0)	0.37
Atrial Fibrillation/Flutter	8 (11.5)	6 (8.4)	0.58
Pulmonary Embolism	8 (11.5)	3 (4.2)	0.11

***cardiac:** *diagnoses include chest pain (unspecified), non-ST elevation myocardial infarction, ST segment elevation, heart failure, poorly controlled hypertension (hypertensive urgency/emergency)*

****gastrointestinal**: *colitis, gastroenteritis, gastrointestinal bleed, acute pancreatitis, abdominal pain (unspecified), diarrhea, emesis*

χ ***pulmonary:** asthma exacerbation, chronic obstructive pulmonary disease exacerbation, pulmonary embolism, pneumonia*

Table 2. Survey responses related to COVID-19 infection perspectives among 140 Black hospitalized patients on the medicine unit for non-COVID related illnesses during the pandemic.

	Patients with obesity n=69	Patients without obesity *n* = 71	*p*-value
I know a lot about COVID-19. n (%)	43 (62.3)	42 (59.1)	0.73
Believe that COVID-19 originated in China, n (%)	51 (73.9)	51 (71.8)	0.85
Knowledge of COVID-19 acquired primarily from television, n (%)	49 (71.0)	51 (71.8)	1.0
How many Americans have been infected with COVID-19? n (%)			0.27
Thousands	13 (18.8)	13 (18.3)	
Hundreds of thousands	18 (26.0)	11 (15.4)	
Millions	38 (55.0)	47 (66.1)	
Believe that 50% or more people infected with COVID-19 need to be admitted to the hospital. n (%)	32 (46.3)	38 (53.5)	0.49
What percentage of people who are infected with COVID-19 die? n (%)			0.04
<=15%	22 (31.8)	15 (21.1)	
16-30%	14 (20.2)	8 (11.2)	
>30%	21 (30.4)	38 (53.5)	
COVID-19 is easily transmitted from person to person. n (%)	61 (88.4)	63 (88.7)	1.0
The African American community has been hit the hardest by the pandemic. n (%)	49 (71.0)	57 (80.2)	0.23
The Hispanic community has been hit the hardest by the pandemic. n (%)	42 (60.8)	46 (64.7)	0.72
I, myself, am at high risk for getting COVID-19. n (%)	52 (75.3)	47 (66.1)	0.26
Prior to this hospitalization, I have been tested for COVID-19. n (%)	53 (76.8)	41 (57.7)	0.02
When a vaccine for COVID-19 becomes available, I will get vaccinated. n (%)	44 (63.7)	45 (64.3)	1.0
Overall, things have been going well for me during the pandemic. n (%)	56 (81.1)	51 (71.8)	0.23
I have been able to have some fun and do things that are enjoyable for me in the last few months during the pandemic. n (%)	32 (46.3)	40 (56.3)	0.31

stating "things were going well". Further, about half of both obese and non-obese respondents reported to have engaged in enjoyable activities in recent months during the pandemic.

3.2. *Discussion*

In this study of African American patients who were hospitalized during the pandemic, we found reasonable

knowledge about COVID-19 – including the origin of the virus and the extent of infections among Americans. The subjects tended to somewhat overestimate the need for hospitalization among those infected; if these beliefs translate into safer practices, this may represent a positive misunderstanding. Black obese patients thoughtfully understood that they themselves were highly susceptible to contracting the disease.

A survey of community dwelling American adults conducted to assess COVID-19 knowledge found that only 15% of African Americans were able to answer all 14 COVID-19 knowledge questions correctly; this performance was worse than that of Caucasians.[19] The greatest disparities were seen on questions dealing with prevention of COVID-19. In another study, African American males younger than 55 years were significantly more likely to report knowing someone with COVID-19, but they had limited knowledge of fomite spread and the recommended preventive measures.[20] In a national assessment related to COVID-19 vaccination, vaccine hesitancy was higher among African Americans.[21] Alsan et al. cited that over 50% of obese African American participants held COVID-19 vaccine or treatment hesitancy beliefs.[22] Further, a Canadian study revealed that obese individuals had some of the lowest confidence in COVID-19 vaccines.[23] Our study demonstrated similar findings -hospitalized obese African American patients understood their high risk of getting COVID-19 yet one third were resistant to vaccination. These studies highlight the need for ongoing efforts for better education and counseling about COVID-19 so as to minimize the health disparity.

Several limitations of this study should be considered. First, this study was conducted on a general medicine ward of a single academic institution. Second, the less than complete rate of enrollment rate is attributable to both participant refusal and patients being discharged prior to being approached. Refusals may trigger concerns about non-response bias. However, it is not unexpected that many hospitalized with acute illness prefer not to participate in the research studies; this phenomenon is routinely encountered in inpatient studies.[24] Because participants were advised that all data was kept confidential and would only be reported in aggregate, they would have no reason to provide disingenuous responses. Third, three members of the study team were involved in administering the surveys to the hospitalized patients. While a specific script was followed to reduce variation and questions were read verbatim, it is possible that this may have introduced bias. Fourth, patients' responses to the survey questions were collected either by a telephone call into their room or as part of an in-person visit by the study team member. This allowed us to include patients in isolation but it introduced some variation in the way in which patients were approached. Because participants were assured that responses were confidential and would only be reported in aggregate, we have no reason to believe that either method would have led to disingenuous answers. Fifth, data was collected over a short period of time and what was known about COVID-19 was rapidly evolving. However, our study focused on the basics of COVID-19 and this information remained unchanged over the course of the study period. Sixth, asking about future behaviors (like intention to accept a vaccine) may yield perspectives that may be ambiguous. Finally, while the majority of questions were objective - focused on knowledge and behaviors, part of this inquiry study explored attitudinal variables. Openly asking people what they think or feel is actually the only viable way to characterize informants' perspectives and feelings.

4. IMPLICATIONS

Hospitalized African Americans, particularly those with obesity, overestimate the risk of hospitalization and death associated with COVID-19 infection. In spite of these beliefs, they are hesitant to accept the most effective public health preventative measure – vaccination. Because hospitalizations are times when patients are focused on their health, it is an opportune time for counseling and education. Teaching patients about practices that promote wellness and prevent disease should be included among the core responsibilities of hospital-based healthcare professionals.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

Research involving human participants: The study received IRB approval from Johns Hopkins University.

DECLARATION OF COMPETING INTEREST

None.

REFERENCES

1. Johns Hopkins University & Medicine. *COVID-19 map* Baltimore, MD: Johns Hopkins University; 2021 *https://coronavirus.jhu.edu/map.html* Accessed August 20th 2021.
2. Alkhatib AL, Kreniske J, Zifodya JS, et al. BMI is associated with coronavirus disease 2019 intensive care unit admission in African Americans. *Obesity (Silver Spring)*. 2020;28(10):1798–1801. doi:10.1002/oby.22937.
3. Petrilli CM, Jones SA, Yang J, et al. Factors associated with hospital admission and critical illness among 5279 people with coronavirus disease 2019 in New York City: prospective cohort study. *BMJ*. 2020;369:m1966 Published 2020 May 22. doi:10.1136/bmj.m1966.
4. Suleyman G, Fadel RA, Malette KM, et al. Clinical characteristics and morbidity associated with coronavirus disease 2019 in a series of patients in metropolitan Detroit. *JAMA Netw Open*. 2020;3(6):e2012270 Published 2020 Jun 1. doi:10.1001/jamanetworkopen.2020.12270.
5. Yancy CW. COVID-19 and African Americans. *JAMA*. 2020;323(19):1891–1892. doi:10.1001/jama.2020.6548.
6. Palaiodimos L, Kokkinidis DG, Li W, et al. Severe obesity, increasing age and male sex are independently associated with worse in-hospital outcomes, and higher in-hospital mortality, in a cohort of patients with COVID-19 in the Bronx, New York. *Metabolism*. 2020;108:154262. doi:10.1016/j.metabol.2020.154262.
7. Kim SJ, Bostwick W. Social vulnerability and racial inequality in COVID-19 deaths in Chicago. *Health Educ Behav*. 2020;47(4):509–513. doi:10.1177/1090198120929677.
8. Gupta R, Agrawal R, Bukhari Z, et al. Higher comorbidities and early death in hospitalized African-American patients with COVID-19. *BMC Infect Dis*. 2021;21(1):78 Published 2021 Jan 18. doi:10.1186/s12879-021-05782-9.
9. Garg S, Kim L, Whitaker M, et al. Hospitalization rates and characteristics of patients hospitalized with laboratory-confirmed coronavirus disease 2019 - COVID-NET, 14 States, March 1-30, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(15):458–464 Published 2020 Apr 17. doi:10.15585/mmwr.mm6915e3.
10. Sze S, Pan D, Nevill CR, et al. Ethnicity and clinical outcomes in COVID-19: a systematic review and meta-analysis. *EClinicalMedicine*. 2020;29:100630. doi:10.1016/j.eclinm.2020.100630.
11. Ebinger JE, Achamallah N, Ji H, et al. Pre-existing traits associated with COVID-19 illness severity. *PLoS One*. 2020;15(7):e0236240 Published 2020 Jul 23. doi:10.1371/journal.pone.0236240.
12. Lockhart SM, O'Rahilly S. When two pandemics meet: why is obesity associated with increased COVID-19 mortality? *Med*. 2020;1(1):33–42 (N Y). doi:10.1016/j.medj.2020.06.005.
13. Sattar N, McInnes IB, McMurray JJV. Obesity is a risk factor for severe COVID-19 infection: multiple potential mechanisms. *Circulation*. 2020;142(1):4–6. doi:10.1161/CIRCULATIONAHA.120.047659.
14. Yang J, Hu J, Zhu C. Obesity aggravates COVID-19: a systematic review and meta-analysis. *J Med Virol*. 2021;93(1):257–261. doi:10.1002/jmv.26237.
15. Yang J, Ma Z, Lei Y. A meta-analysis of the association between obesity and COVID-19. *Epidemiol Infect*. 2020;149:e11 Published 2020 Dec 22. doi:10.1017/S0950268820003027.
16. Pettit NN, MacKenzie EL, Ridgway JP, et al. Obes'ts with COVID-19. *Obesity (Silver Spring)*. 2020;28(10):1806–1810. doi:10.1002/oby.22941.
17. Harris CM, Rios R, Landis R, Khaliq W, Wright S. Receptivity to weight management interventions among hospitalized obese patients: an untapped opportunity. *South Med J*. 2013;106(6):337–342. doi:10.1097/SMJ.0b013e31829680ff.
18. Centers for Disease Control and Prevention. About adult BMI. https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi. Accessed April 21st 2021
19. Bogart LM, Ojikutu BO, Tyagi K, et al. COVID-19 related medical mistrust, health impacts, and potential vaccine hesitancy among black Americans living with HIV. *J Acquir Immune Defic Syndr*. 2021;86(2):200–207. doi:10.1097/QAI.0000000000002570.
20. Jones J, Sullivan PS, Sanchez TH, et al. Similarities and differences in COVID-19 awareness, concern, and symptoms by race and ethnicity in the United States: cross-sectional survey. *J Med Internet Res*. 2020;22(7):e20001 Published 2020 Jul 10. doi:10.2196/20001.
21. Khubchandani J, Sharma S, Price JH, Wiblishauser MJ, Sharma M, Webb FJ. COVID-19 vaccination hesitancy in the United States: a rapid national assessment. *J Commun Health*. 2021;46(2):270–277. doi:10.1007/s10900-020-00958-x.
22. Alsan M, Stantcheva S, Yang D, Cutler D. Disparities in coronavirus 2019 reported incidence, knowledge, and behavior among US adults. *JAMA Netw Open*. 2020;3(6):e2012403 Published 2020 Jun 1. doi:10.1001/jamanetworkopen.2020.12403.
23. Vallis M, Glazer S. Protecting individuals living with overweight and obesity: attitudes and concerns toward COVID-19 vaccination in Canada. [published correction appears in Obesity (Silver Spring). 2021 Jul 26;:]. *Obesity (Silver Spring)*. 2021;29(7):1128–1137. doi:10.1002/oby.23182.
24. Compton J, Glass N, Fowler T. Evidence of selection bias and non-response bias in patient satisfaction surveys. *Iowa Orthop J*. 2019;39(1):195–201.