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Impact of Body Mass Index on Heart Failure by Race/Ethnicity From Get With The Guidelines–Heart Failure (GWTG–HF) Registry

Tiffany M. Powell-Wiley, MD, MPH,[a] Julius Ngwa, PhD,[b] Selomie Kebede, MD,[b] Di Lu, MS,[c] Phillip J. Schulte, PhD,[d] Deepak L. Bhatt, MD, MPH,[e] Clyde Yancy, MD,[f] Gregg C. Fonarow, MD,[g] Michelle A. Albert, MD, MPH[h]

ABSTRACT

OBJECTIVES This study sought to evaluate the influence of race/ethnicity on the relationship between body mass index (BMI) and mortality in heart failure with preserved ejection fraction (HFpEF) and HF with reduced EF (HFrEF) patients.

BACKGROUND Prior studies demonstrated an "obesity paradox" among overweight and obese patients, where they have a better HF prognosis than normal weight patients. Less is known about the relationship between BMI and mortality among diverse patients with HF, particularly given disparities in obesity and HF prevalence.

METHODS The authors used Get With The Guidelines-Heart Failure data to assess the relationship between BMI and in-hospital mortality by using logistic regression modeling. The authors assessed 30-day and 1-year rates of all-cause mortality following discharge by using Cox regression modeling.

RESULTS A total of 39,647 patients with HF were included (32,434 [81.8%] white subjects; 3,809 [9.6%] black subjects; 1,928 [4.9%] Hispanic subjects; 544 [1.4%] Asian subjects; and 932 [2.3%] other subjects); 59.7% of subjects had HFpEF, and 30.7% were obese. More black and Hispanic patients had Class I or higher obesity (BMI $\geq$30 kg/m^2) than whites, Asians, or other racial/ethnic groups ($p < 0.0001$). Among subjects with HFpEF, higher BMI was associated with lower 30-day mortality, up to 30 kg/m^2 with a small risk increase above 30 kg/m^2 (BMI: 30 vs. 18.5 kg/m^2), hazard ratio (HR) of 0.63 (95% confidence interval [CI]: 0.54 to 0.73). A modest relationship was observed in HFrEF subjects (BMI: 30 vs. 18.5 kg/m^2; HR: 0.73; 95% CI: 0.60 to 0.89), with no risk increase above 30 kg/m^2. There were no significant interactions between BMI and race or ethnicity related to 30-day mortality ($p > 0.05$).

CONCLUSIONS This work is one of the first suggesting the obesity paradox for 30-day mortality exists at all BMI levels in HFrEF but not in patients with HFpEF. Higher BMI was associated with lower 30-day mortality across racial/ethnic groups in a manner inconsistent with the J-shaped relationship noted for coronary artery disease. The differential slope of obesity and mortality among HFpEF and patients with HFrEF potentially suggests differing mechanistic factors, requiring further exploration. (J Am Coll Cardiol HF 2018;■:■–■) Published by Elsevier on behalf of the American College of Cardiology Foundation.

From the [a]Cardiovascular Branch, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland; [b]Division of Cardiovascular Medicine, Howard University Hospital and School of Medicine, Washington, DC; [c]Duke Clinical Research Institute, Duke University School of Medicine, Durham, North Carolina; [d]Department of Health Sciences Research, Mayo Clinic, Rochester, Minnesota; [e]Heart and Vascular Center, Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts; [f]Cardiovascular Division, Feinberg School of Medicine, Northwestern University, Chicago, Illinois; [g]Ronald Reagan University of California at Los Angeles Medical Center, Los Angeles, California; and the [h]Center for the Study of Adversity and Cardiovascular Disease (NURTURE Center), Cardiology Division, University of California at San Francisco Medical Center, San Francisco, California. The views expressed in this manuscript are those of the authors and do not necessarily represent the views of the National Heart, Lung, and Blood Institute, the National Institutes of Health, or the U.S. Department of Health and Human Services. The Get With The Guidelines-Heart Failure program is provided by the American Heart Association, is sponsored, in part, by Amgen Cardiovascular, and has been funded in the past through support from Medtronic, GlaxoSmithKline, Ortho-McNeil, and the American Heart Association Pharmaceutical Roundtable. Dr. Powell-Wiley is supported by the Division of Intramural Research of the National, Heart, Lung, and Blood Institute of the National Institutes of Health. Dr. Bhatt is an advisory board member of Cardax, Elsevier Practice Update Cardiology, Medscape Cardiology, and Regado Biosciences; a member of the board of directors of Boston VA Research Institute, and Society of Cardiovascular Patient Care; a chair of the

ABBREVIATIONS AND ACRONYMS

BMI = body mass index

GWTG-HF = Get With The Guidelines-Heart Failure

HF = heart failure

HFpEF = heart failure with preserved ejection fraction

HFrEF = heart failure with reduced ejection fraction

Both obesity and heart failure (HF) are unremitting in their rise. In the United States, 35% of Americans are obese (1) and HF affects 5.7 million individuals (2). Consequently, these conditions combined contribute to an estimated $246 billion in health care expenditure (3-5). Although evidence independently implicates being overweight (body mass index [BMI] ≥25 kg/m^2) and obesity (BMI ≥30 kg/m^2) with increased HF risk (1), most studies have suggested that increased BMI is associated with lower mortality in patients with HF (6,7). However, whether this relationship differs between patients with HF with preserved ejection fraction (HFpEF) and those with HF with reduced EF (HFrEF) and whether there are important differences among patients with HF of different racial/ethnic groups are less clear.

Considering the diverse racial composition of the United States, the association of race or ethnicity on any relationship between BMI and HF mortality becomes increasingly important. For example, African Americans have the highest rates of both overweight/obesity and HF compared to other racial/ethnic groups in the United States (8), as well as increased HF and HF hospitalization rates (9), factors likely significantly contributing to gaps in mortality and longevity by race or ethnicity. Additionally, as hospital readmissions are higher in blacks and Hispanics (10-13) and readmissions are closely linked to morbidity and mortality, it is imperative that the association between BMI and HF be characterized both in general and according to race/ethnicity to understand its effect on HF outcomes and to potentially inform therapeutic interventions. Using Get With The Guidelines Heart Failure (GWTG-HF) registry data for both HFpEF and patients with HFrEF, we sought, first, to assess the association between BMI and in-hospital mortality according to race/ethnicity; and, second, to determine associations between BMI and 30-day and 1-year all-cause mortality following discharge alive according to race/ethnicity.

METHODS

DATA SOURCE. The GWTG-HF is a registry and performance improvement initiative started in 2005 to enhance adherence to practice guidelines for hospitalized patients with HF. This voluntary American Heart Association program collects data for patient characteristics by using Web-based information systems. The program's methods, design, and validity have been published previously (14-17). Hospitals participating in the registry submit clinical information regarding medical history, laboratory results, diagnostic test results, hospital care, and outcomes of patients hospitalized for HF by using an online, interactive case report form and patient management tool (Quintiles, Cambridge, Massachusetts). To be eligible for GWTG-HF, patients must be adults hospitalized for a HF episode as the primary cause of admission or demonstrate significant HF symptoms that developed during hospitalization with a primary discharge diagnosis of HF. Race/ethnicity data were collected for evaluating subgroup differences in outcomes. Patients were assigned to race/ethnicity group based on their self-reported race/ethnicity, using the following options defined by the case report form: American Indian or Alaska Native, Asian, black or African-American, Native Hawaiian or Pacific Islander, white or unable to be determined, or ethnicity, Hispanic: yes, no, or unable to be determined.

American Heart Association Quality Oversight Committee; is on the data monitoring committees of Duke Clinical Research Institute, Harvard Clinical Research Institute, Mayo Clinic, and Population Health Research Institute; has received honoraria from the American College of Cardiology (senior associate editor, *Clinical Trials and News*, ACC.org), Belvoir Publications (Editor-in-Chief, *Harvard Heart Letter*), Duke Clinical Research Institute (clinical trial steering committees), Harvard Clinical Research Institute (clinical trial steering committee), HMP Communications (Editor-in-Chief, *Journal of Invasive Cardiology*), *Journal of the American College of Cardiology* (guest editor, associate editor), Population Health Research Institute (clinical trial steering committee), Slack Publications (chief medical editor, *Cardiology Today's Intervention*), Society of Cardiovascular Patient Care (secretary/treasurer), and WebMD (CME steering committees); has served on Clinical Cardiology (deputy editor), NCDR-ACTION Registry steering committee (chair), and VA CART Research and Publications Committee (chair); has received funding from Amarin, Amgen, AstraZeneca, Bristol-Myers Squibb, Eisai, Ethicon, Forest Laboratories, Ischemix, Medtronic, Pfizer, Roche, Sanofi, and The Medicines Company; receives royalties from Elsevier (editor, *Cardiovascular Intervention: A Companion to Braunwald's Heart Disease*; is a site co-investigator for Biotronik, Boston Scientific, and St. Jude Medical; is a trustee for the American College of Cardiology; and has performed unfunded research for FlowCo, PLx Pharma, and Takeda. Dr. Fonarow has received research support from the Agency for Healthcare Research and Quality, and the National Institutes of Health; and is a consultant for Amgen, Janssen, Novartis, Medtronic, and St. Jude. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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