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Diagnostic and therapeutic challenges for PCPs regarding heart failure with preserved ejection fraction and obesity: results of an online internet-based survey

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Abstract

Background Obesity (body mass index ≥ 30 kg/m^2) is a major risk factor for heart failure with preserved ejection fraction (HFpEF) and affects most patients with HFpEF. Patients living with obesity may experience delays in HFpEF diagnosis and management. We aimed to understand the clinical journey of patients with obesity and HFpEF and the role of primary care providers (PCPs) in diagnosing and managing patients with both conditions.

Methods An anonymous, US population-based online survey was conducted in September 2020 among 114 patients with self-reported HFpEF and obesity and 200 healthcare providers, 61 of whom were PCPs who treat patients with HFpEF and obesity.

Results Half of patients (51%) with HFpEF reported waiting an average of 11 months to discuss their symptoms with a PCP; 11% then received their diagnosis from a PCP. PCPs initiated treatment and oversaw the management of HFpEF only 35% of the time, and 44% of PCPs discussed obesity treatment medication options with their patients. Only 20% of PCPs indicated they had received formal obesity management training, and 79% of PCPs indicated they would be interested in obesity management training and support.

Conclusion PCPs could play a valuable role in addressing obesity and referring patients with obesity and signs and symptoms of HFpEF to cardiologists. Increased awareness of HFpEF and its link to obesity may help PCPs more quickly identify and diagnose their patients with these conditions.

Plain Language Summary

Heart failure with preserved ejection fraction (HFpEF) is a common form of heart failure. Many patients who have HFpEF also have obesity or excess weight. We wanted to understand the medical experience of patients with HFpEF and obesity and the role that primary care providers (PCPs) play in managing patients with these diseases. We surveyed 114 patients with HFpEF and obesity and 200 healthcare providers who treat patients with HFpEF and obesity, 61 of whom were PCPs. One-quarter of patients had a major heart-related event that led to their HFpEF diagnosis. Half of the patients said they had an initial discussion about HFpEF symptoms with a PCP, but only

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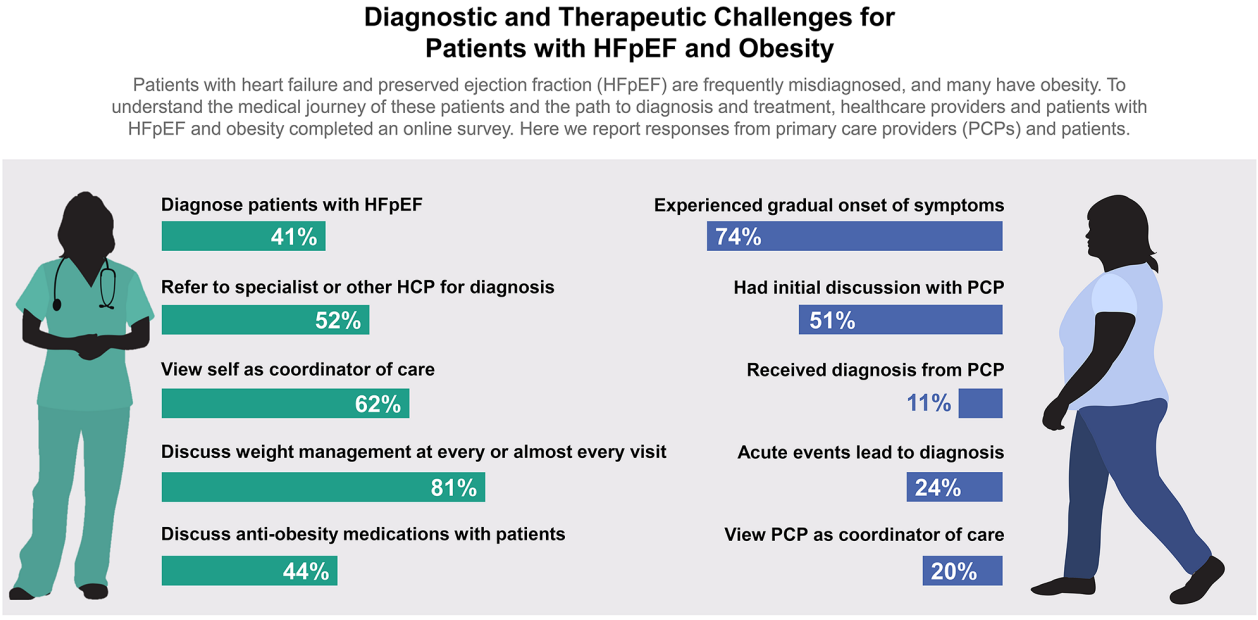
one in ten were diagnosed by a PCP. Few PCPs said they received obesity management training, but most were interested in receiving more obesity management training and support. PCPs play an important role in organizing care for patients with HFpEF and obesity. However, there is room to improve HFpEF awareness and access to obesity management tools and strategies among PCPs.

Keywords Heart failure, Obesity management, Surveys and questionnaires, Primary Health Care

Graphical Abstract



There is an opportunity to increase diagnostic HFpEF education for PCPs, as coordinated care between specialists and PCPs to manage patients with HFpEF and obesity is paramount. PCPs have a critical role in engaging patients in obesity management for the treatment of HFpEF.

Background

Heart failure (HF) is rapidly becoming a global public health concern [1]. In the United States (US), approximately six million people are affected by HF, and it is a leading cause of hospitalizations each year [2]. Patients with HF are typically segmented into subtypes based on their ejection fraction (HF with reduced ejection fraction [HFrEF], HF with mildly reduced ejection fraction [HFmrEF], and HF with preserved ejection fraction [HFpEF]) [2]. HFpEF accounts for the majority of all patients with HF and is closely related to multiple comorbidities, which include obesity [3–5]. HFpEF is a challenging clinical entity with five-year survival rates ranging from 68 to 76% in three studies [6–8]. The health status (symptoms, physical limitations, and quality of life) of patients with HFpEF is as poor or worse than that of patients with HFrEF [9–11]. In recent years, the understanding of HFpEF has evolved from being perceived as mere left ventricular diastolic dysfunction to a complex multiorgan syndrome. This transformation has been attributed to the increasing appreciation of comorbidities such as obesity in the management of these patients [12].

As the US population ages and body mass index (BMI) continues to rise, the prevalence of HFpEF is expected to increase [13]. Obesity is closely linked to HFpEF, with more than 50% of patients with HFpEF having a BMI ≥ 30 kg/m² [3, 14, 15]. Overall, the degree of visceral adiposity is the strongest predictor of incident HFpEF [16]. Abdominal obesity (defined in the US as waist circumference > 40 inches in men and > 35 inches in women [2]) is a predictor of cardiovascular mortality and non-cardiovascular mortality in patients with HFpEF, independent of BMI [17]. Increases in visceral abdominal fat are also strongly tied to hemodynamic abnormalities leading to symptoms in patients with HFpEF [18, 19].

Natriuretic peptide (NP) deficiency is observed in patients with obesity, resulting in low values of B-type and N-terminal pro-B-type NP (BNP and NTproBNP, respectively), due to reduced production of natriuretic peptides by the myocardium and increased clearance of natriuretic peptides by adipocytes. This is also a barrier because clinicians may be misled to accept that a low natriuretic peptide value excludes HFpEF, even though it does not [20]. Additional barriers, such as time and resource constraints, may prevent primary care providers

(PCPs) from being able to perform a thorough diagnostic evaluation of suspected HFpEF in patients with obesity and instead choose to refer patients to specialists for a more comprehensive examination [21]. Patients, in turn, may remain unaware of their risk for HFpEF but progress until they are formally evaluated, diagnosed, and treated.

There is a lack of information in the literature regarding the clinical journey of patients with HFpEF and obesity. Therefore, in this study, we aimed to (1) understand the typical medical journey of patients with both HFpEF and obesity by mapping out various touchpoints within the healthcare system; (2) gain insight into the pivotal role played by PCPs in the diagnosis and treatment of patients with HFpEF and obesity; and (3) identify and analyze various factors that may influence diagnosis and treatment decisions.

Materials and methods

Study design

A cross-sectional study consisting of an anonymous US-based online survey was conducted among patients with obesity and a self-reported HFpEF diagnosis and among healthcare professionals (HCPs) treating patients with HFpEF and obesity. The survey was conducted by a third-party vendor (KJT Group, Inc., Rochester, NY, USA). Data were collected from September 3 to September 29, 2020. All respondents were recruited via email from online panel companies (ClinicalVoice Community, Survey Healthcare Global, Definitive Healthcare Dynata LLC, Schlesinger Group, and Cint) of individuals (general population and healthcare professionals) across the US to which they have provided permission to be contacted for survey research. All participants provided informed consent prior to completing the survey and could withdraw at any time, and participants who completed the entire survey received a modest monetary incentive. The study protocol was submitted to the Western Institutional Review Board for ethical approval and was determined to qualify for exemption status because sufficient protections were in place to protect the privacy of subjects and to maintain the confidentiality of data.

The surveys were developed following a literature review and qualitative research with HCPs and patients with HFpEF and obesity who met the same inclusion/exclusion criteria as the quantitative survey. The qualitative phase of the study consisted of an online bulletin board and telephone interviews among 33 patients and telephone interviews among 28 HCPs. Patients participating in the qualitative phase were similarly distributed geographically across the four primary regions of the US (Northeast, South, Midwest, and West); two-thirds were female. Participating HCPs primarily included physicians ($n=21$). Of the 28 HCPs, half ($n=14$) practiced in cardiology, $n=8$ in primary care, $n=3$ in endocrinology, and $n=3$ in pulmonology. Separate surveys were used for HCPs (Appendix 1) and for patients (Appendix 2) to measure attitudes and experiences with HFpEF prior to diagnosis, experience during the diagnostic process, management and treatment of HFpEF, HFpEF management guidelines (HCPs only), and obesity discussions/management/attitudes. Patients and HCPs were independent of each other (i.e., they were not matched pairs). In the patient survey, healthcare professionals (HCPs) were defined as a primary care doctor, a specialist such as a cardiologist, or a nurse practitioner.

Study participants

To be included in the study, patients were required to be US residents 30 years of age or older who self-reported a previous diagnosis of HFpEF by a healthcare professional and had obesity based on self-reported height and weight (BMI ≥ 30 kg/m^2). Qualification for the survey was determined by a series of screening questions. After answering a few demographic questions, respondents were asked if they had been diagnosed by a healthcare professional with several medical conditions displayed in a list. Respondents indicating that they have been diagnosed with "cardiovascular/heart disease (including heart failure)" were then asked if their HCP ever told them they had HF. If they answered "yes" or "not sure," they were then asked about the type of HF with which they were diagnosed: "Systolic heart failure/Reduced Ejection Fraction (HFrEF)" or "Diastolic heart failure/Preserved Ejection Fraction (HFpEF);" an answer option of "not sure" was also provided. Respondents who were unsure were presented with a definition of HFrEF and HFpEF; those who confirmed a diagnosis of HFpEF continued to the next question in the screener. Patients were then asked to report their height and weight, which were used to calculate BMI.

Inclusion in the study required HCPs to be employed in US facilities (except Maine and Vermont to comply with Sunshine Act reporting requirements) that are not government facilities or ambulatory surgical centers, be board-certified and in practice for three to 35 years as a physician or nurse practitioner/physician assistant in primary care (family practice, general practice, or internal medicine) or in cardiology, and have treated at least five patients (PCPs) or ten patients (cardiologists) in the past month with HFpEF and obesity. Sample quotas were set by specialty (primary care and cardiology). This paper focuses on the responses of PCPs.

Statistical analyses

Descriptive statistical analyses (means, frequencies) were performed using Q Research Software for Windows 23 (A Division of Displayr, Inc., New South Wales, Australia). Tests of differences (chi square, t-tests) within

Table 1 Sample characteristics of patients

Characteristics of Survey Respondents	Patients with HFpEF and Obesity (*N* = 114)
Mean age (SD), ***years***	55.7 (13.1)
Gender, ***n*(%)**	
Female	65 (57)
Male	49 (43)
Mean age of symptom onset, ***years (SD)***	47.0 (11.6)
Ethnicity, ***n*(%)**[a]	
White	97 (85)
Black/African American	18 (16)
Spanish/Hispanic or Latino	9 (8)
Asian	4 (4)
American Indian or Alaska Native	2 (2)
Other	1 (1)
Prevalence of top self-reported comorbidities that have been diagnosed by an HCP, ***n*(%)**	
Hypertension	73 (64)
Obesity	61 (54)
Obstructive sleep apnea	51 (45)
Type 2 Diabetes	48 (42)
Dyslipidemia	43 (38)
Asthma	26 (23)
Chronic obstructive pulmonary disorder	25 (22)
BMI class, ***n*(%)**[b]	
Class 1 (30 - < 35 kg/m^2)	48 (42)
Class 2 (35 - < 40 kg/m^2)	29 (25)
Class 3 (≥ 40 kg/m^2)	37 (32)
Region, ***n*(%)**[b]	
Northeast	23 (20)
Midwest	21 (18)
South	49 (43)
West	21 (18)

[a] Responses add to > 100% because participants could select more than one response

[b] Percentages may not add to 100% due to rounding

Healthcare professional: defined as a primary care doctor, a specialist such as a cardiologist, or a nurse practitioner on the patient survey

Abbreviations: BMI, body mass index; HFpEF, heart failure with preserved ejection fraction; HCP, healthcare professional; SD, standard deviation

Table 2 Sample characteristics of healthcare providers

Characteristics of Survey Respondents	HCPs (*N* = 200)	PCPs* (*n* = 61)
Setting, ***n*** (%)[a]		
Urban	62 (31)	18 (30)
Suburban	113 (57)	30 (49)
Rural	25 (13)	13 (21)
Region, ***n*(%)**[a]		
Northeast	56 (28)	15 (25)
Midwest	43 (22)	20 (33)
South	71 (36)	18 (30)
West	30 (15)	8 (13)
Gender, ***n*(%)**[a]		
Male	138 (69)	30 (49)
Female	59 (30)	29 (48)
Transgender	2 (1)	1 (2)
Do not identify as female, male or transgender	1 (1)	1 (2)
Mean time in practice (SD), ***years***	17.4 (8.1)	17.6 (7.7)
HCP licensure, ***n*(%)**[a]		
Physician	148 (74)	30 (49)
Nurse Practitioner	39 (20)	21 (34)
Physician Assistant	13 (7)	10 (16)
HCPs with an obesity management focus, ***n*(%)**		
Yes	NA	39 (64)

[a] Percentages may not add to 100% due to rounding

*Primary care providers defined as board-certified physicians, nurse practitioners, and physician assistants specializing in internal medicine, general practice, and family practice, in practice for three to 35 years, and have treated at least five patients in the past month with HFpEF and obesity

Abbreviations: HCP, healthcare professional; PCP, primary care provider; SD, standard deviation

respondent types were performed using Q Research Software tables; additional analyses were performed using Stata/IC 14.1. Statistical significance was set at $p<0.05$, using 2-tailed tests. Data are presented as number and percentage for categorical variables, and continuous data expressed as the mean ± standard deviation (SD) unless otherwise specified.

Results

Sample characteristics

Of the 3,946 patients who entered the survey, 114 qualified for and completed the survey; the remainder did not meet the qualification criteria ($n=3,470$) or did not finish the survey ($n=362$). Of the total patient respondents, the mean age was 56 years, and there was a slightly higher proportion of females than males, reflecting typical characteristics of patients with HFpEF. Slightly more than half (54%) of the respondents reported that they had been diagnosed with obesity by an HCP; although, in order to qualify for the study, participants had to have a self-reported height and weight equivalent to ≥ 30 kg/m^2. Additional characteristics are shown in Table 1.

Of the 1,228 healthcare professionals entering the survey, 1,028 did not meet the qualification criteria ($n=689$), did not finish the survey ($n=183$), or were over the allotted quota ($n=156$). Of the 200 qualified healthcare professional participants, 61 identified as PCPs. The majority of PCPs reported having a specific practice focus on obesity management, as presented in Table 2.

Patient journey

To understand the typical medical journey for a patient with HFpEF and obesity, we analyzed a subset of patients who experienced a similar progression of events to construct what has been termed "the most common patient

pathway." Our survey found that 76% of patients ($n=80$) had a similar medical journey consisting of an initial discussion with an HCP about HFpEF symptoms, followed by diagnosis and treatment. In this pathway, the mean age of symptom onset was 48 years (SD = 11.6) (Fig. 1). Five additional pathways were identified, each accounting for 1–8% of the remaining patients. These pathways varied with regard to the ordering of the milestones of initial discussion, diagnosis, and treatment (as some patients were diagnosed in the emergency department with a more detailed discussion occurring with their HCP at a later date), timing between these milestones, and age of symptom onset.

The majority (74%) of patients in the most common pathway experienced gradual symptom onset, with symptoms persisting for an average of 11 months prior to discussions with an HCP; the remaining 26% experienced an acute event/sudden onset, such as a cardiac event, that precipitated a diagnosis of HFpEF. Among patients experiencing gradual symptom onset, the main reasons reported for not discussing their symptoms sooner included a belief that the symptoms were due to normal aging or another condition, a fear of finding out what the problem was, or not wanting to admit they were experiencing a health issue. Half of patients reported that initial discussions about symptoms occurred with a PCP, yet significantly fewer received their diagnosis or initial treatment from a PCP (Fig. 1). Roughly half of patients waited an average of 22 months to be diagnosed after having an initial conversation with an HCP.

Those who experienced a gradual onset of symptoms reported typical symptoms of heart failure, including shortness of breath with exertion or at rest or lying flat (83%), fatigue (80%), difficulty participating in/completing physical activity (72%), swelling of lower extremities (62%), and chest pain or discomfort (59%). Patients with HFpEF and Class 3 obesity (defined as BMI ≥ 40.0 kg/m^2) were significantly more likely than patients with HFpEF and Class 1 obesity (BMI 30.0–34.9 kg/m^2) to report shortness of breath as an early symptom (89% vs. 73%, respectively, $p<0.05$).

Diagnosis

PCPs reported that, on average, they diagnose less than half (41%) of patients with obesity with HFpEF themselves and refer half (52%) to a specialist or other HCP. This differs from the most common pathway, where patients with HFpEF and obesity reported they were diagnosed with HFpEF by PCPs only 11% of the time. PCPs who personally diagnose patients with HFpEF and obesity ($n=46$) reported discussing symptoms of HFpEF with patients primarily at appointments made for another reason; some reported discussion occurred at an appointment made specifically to discuss HFpEF symptoms or during an acute cardiac event in which they cared for the patient (Fig. 2). PCPs who reported they typically referred patients to specialists to confirm a HFpEF diagnosis ($n=38$) most frequently referred to cardiologists (89%). The majority (62%) of PCPs viewed themselves as the coordinator of care for patients with HFpEF and obesity, but only 20% of patients viewed PCPs as such.

Treatment for HFpEF and obesity

When asked about the proportion of their patients with HFpEF and obesity they personally treat, PCPs reported initiating treatment for HFpEF for about one-third of patients (35%), adjusting treatment for 31%, and referring 37% to other HCPs for treatment. Most PCPs reported discussing weight management at every visit (25%) or almost every visit (56%). Most PCPs reported explaining to their patients the negative effects that excess weight has on overall health (90%) and on HFpEF (84%), specifically. PCPs discussed anti-obesity medications (AOMs) with patients 44% of the time and prescribed AOMs to patients with HFpEF and obesity 19% of the time. PCPs reported predominantly recommending lifestyle changes to newly diagnosed patients, followed by pharmacologic treatments (Fig. 3).

More than half of PCPs (57%) indicated that they have a responsibility to actively contribute to their patients' weight loss efforts. However, nearly half (49%) also believe that in order for their patients to successfully lose

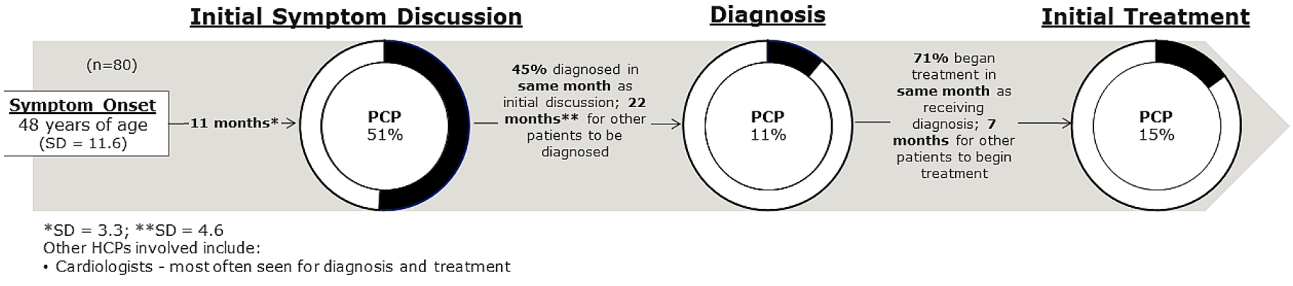


Fig. 1 Most common pathway for patients with HFpEF and obesity, which includes patients who had initial discussions with HCPs, followed by a HFpEF diagnosis, and ultimately treatment for HFpEF. Abbreviations: SD, standard deviation; HCPs, healthcare providers; HFpEF, heart failure with preserved ejection fraction; PCP, primary care provider

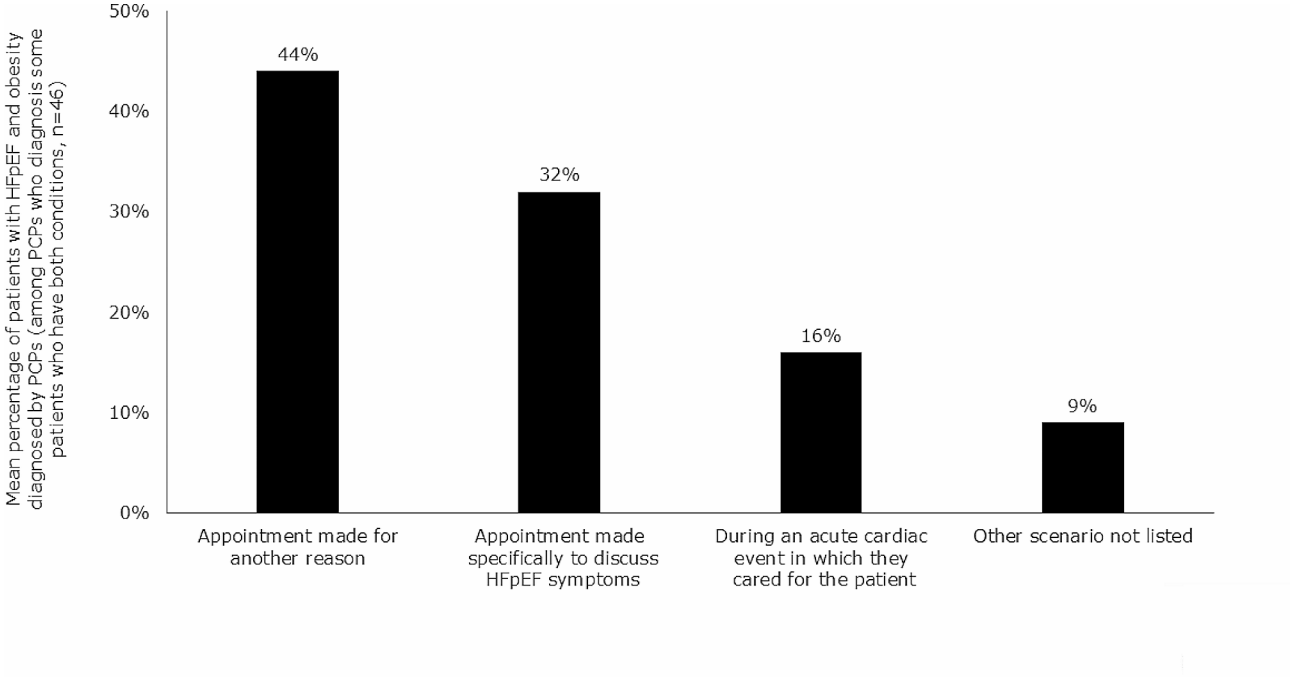


Fig. 2 Among the patients with HFpEF and obesity whom PCPs personally diagnose with HFpEF, the mean percentage of patients in each presented scenario where HFpEF symptoms are first discussed. Abbreviations: HFpEF, heart failure with preserved ejection fraction; PCP, primary care provider

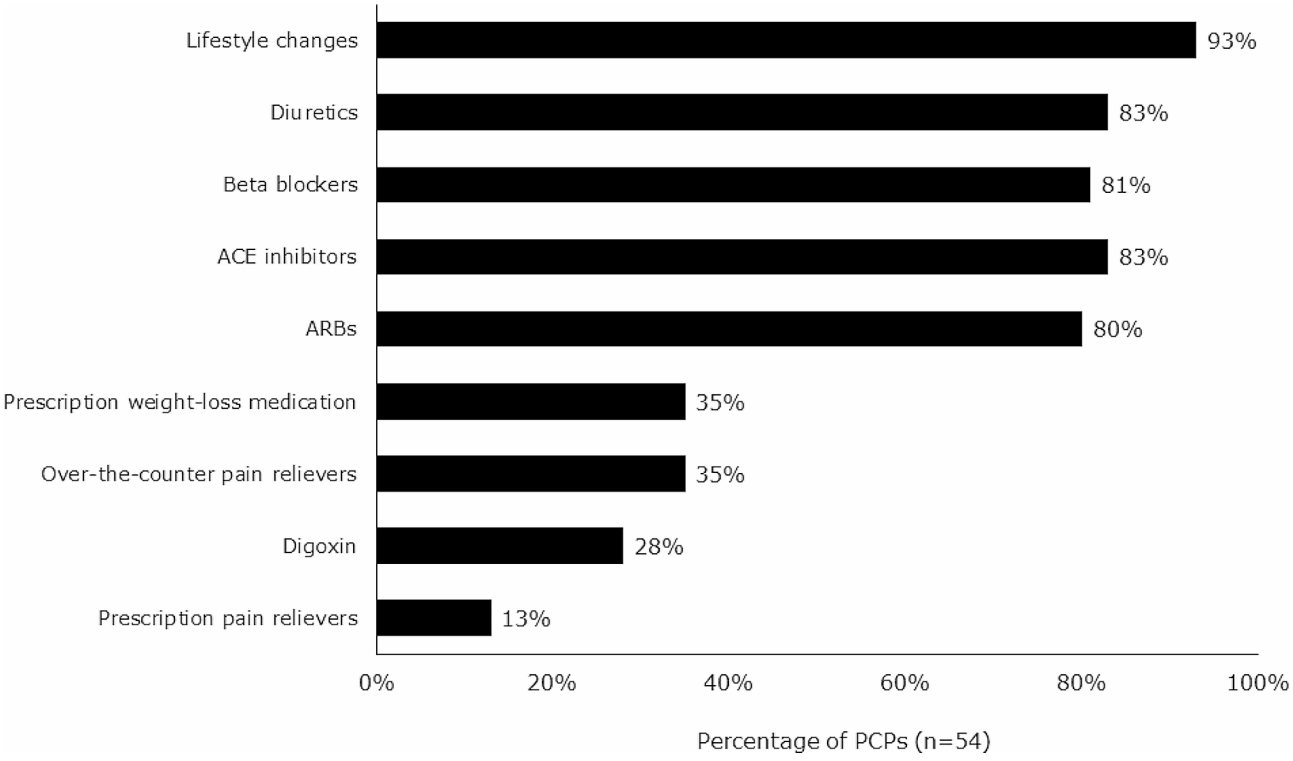


Fig. 3 Percentage of PCPs reporting the types of treatments they personally prescribe or recommend to patients with HFpEF and obesity for the treatment of HFpEF symptoms (for both newly diagnosed patients and ongoing treatment/management). Abbreviations: ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blockers; HCP, healthcare professional; HFpEF, heart failure with preserved ejection fraction; PCP, primary care provider

weight, patients must be willing to completely change their lifestyle (Fig. 4). Only 20% of PCP respondents indicated that they have received formal training in obesity management, but 79% of PCPs indicated that they would be interested in additional obesity management training and support.

Patient understanding of the link between HFpEF and obesity

Most patients with HFpEF and obesity report that they understand HFpEF to be closely linked to obesity. When asked to identify causes of HFpEF, patients cited excess weight/being overweight (66%), lifestyle habits (55%), and genetics (45%) as the primary causes. Males (78%) were more likely than females (57%) to attribute HFpEF causation to excess weight/being overweight ($p<0.05$). Most patients with HFpEF and obesity ($n=83$, 73%) reported that their HCP specifically discussed weight management at the time of diagnosis. About half of patients with HFpEF and obesity recognized that obesity impacts initial development of HFpEF (46%), how quickly HFpEF progresses (53%), and severity of HFpEF symptoms (51%) (Fig. 5). Patients with Class 2 or 3 obesity were more likely than patients with Class 1 obesity to feel the impacts of weight on HFpEF progression (66% and 65%, respectively vs. 35%) and symptom severity (62% and 62%, respectively, vs. 35%).

Discussion

Obesity is a well-established comorbidity and causal factor of HFpEF, leading to adverse pathophysiological profiles and contributing to unfavorable cardiovascular outcomes [14, 16, 18, 22–25]. While patients with HFpEF may have other conditions that also impact these outcomes, obesity has been shown in numerous studies to be a strong risk modifier for HFpEF [2–4, 21]. Patients with obesity and HFpEF may present with nonspecific symptoms that may be attributable to associated comorbidities; symptoms such as breathlessness and exercise intolerance may be ascribed to "being overweight," and natriuretic peptide values are often lower than typical diagnosis thresholds for HFpEF. Therefore, the diagnosis of HFpEF, particularly in patients with obesity, is often missed in a primary care setting [26]. Even PCPs who approach HFpEF with a high level of clinical suspicion may lack the tools to confirm a diagnosis themselves, as HFpEF is typically identified through echocardiography, catheterization, or invasive exercise testing [27].

This study demonstrates that many patients with obesity experience symptoms typical of heart failure but lack the awareness of the severity of those symptoms and, therefore, delay seeking medical attention. This delay is represented in the "most common pathway" identified in this study, where patients wait nearly a year, on average, with symptoms before seeking medical attention, either routinely with a PCP or more urgently due to an acute event. While PCPs can help facilitate expeditious

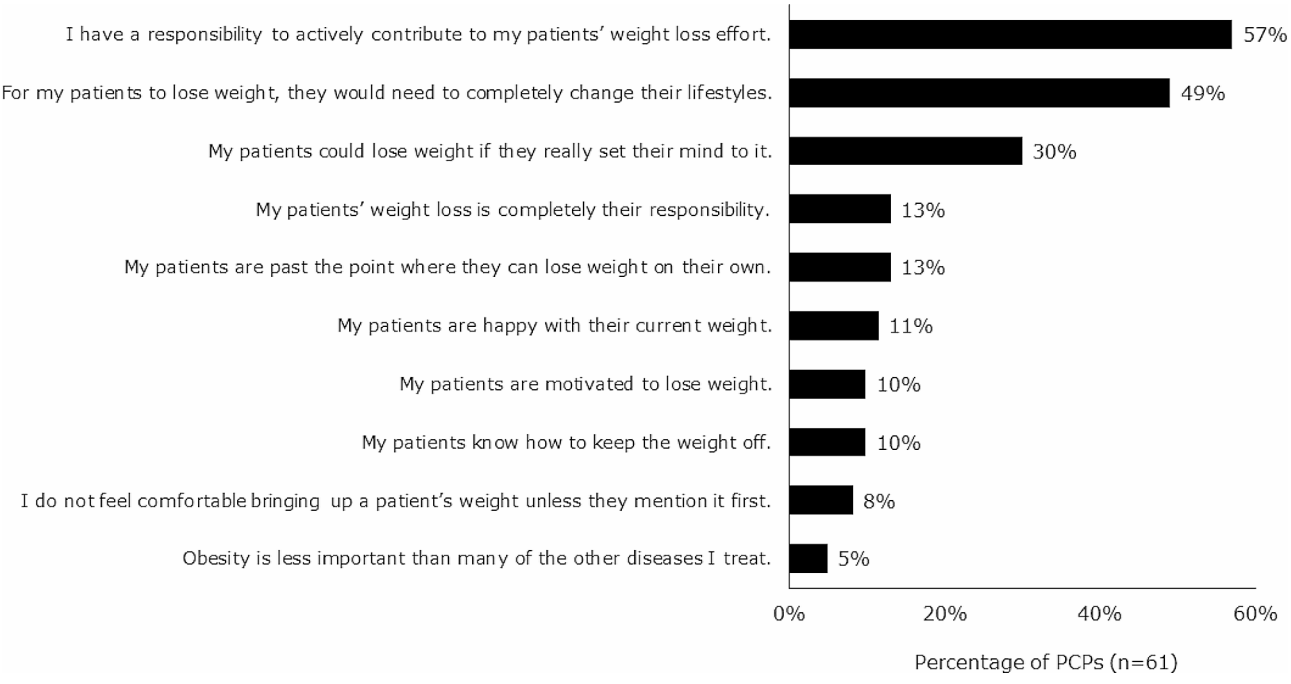


Fig. 4 PCPs' agreement with statements about their role and the roles of their patients in weight loss management. Percentage of respondents indicating their level of agreement was a 6 or a 7 where "1" meant "Do not agree at all" and "7" meant "Completely agree." Abbreviations: HFpEF, heart failure with preserved ejection fraction; PCP, primary care provider

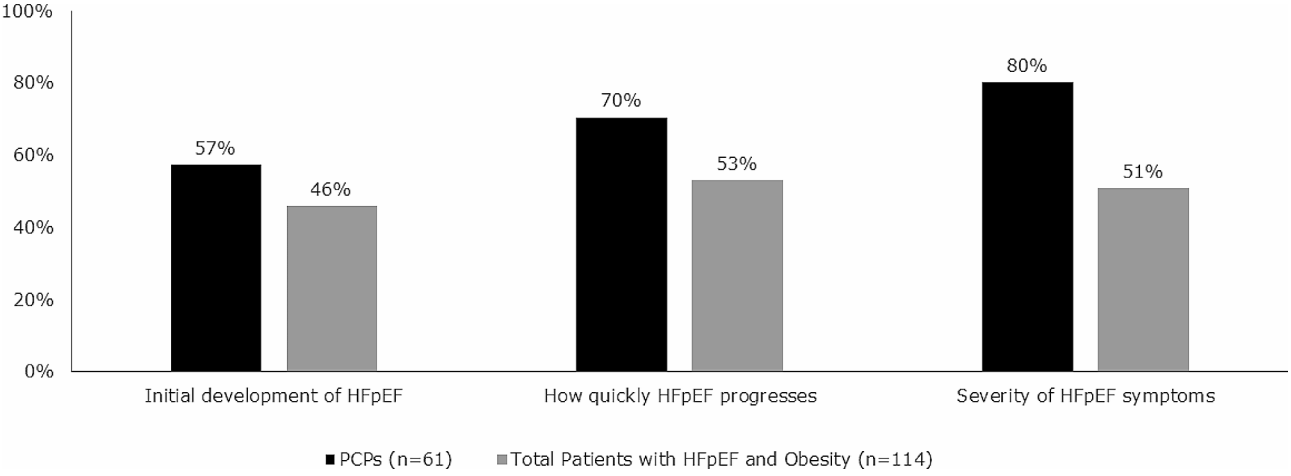


Fig. 5 PCPs' and patients' perceptions of the impact obesity has on HFpEF development, progression, and severity. Percentage of respondents indicating the level of impact was a 6 or 7 where "1" means "Doesn't impact at all" and "7" means "Greatly impacts." Abbreviations: HFpEF, heart failure with preserved ejection fraction; PCP, primary care provider

referrals to specialists, our study found that many patients who are referred to a specialist experience further delays in receiving treatment for HFpEF, sometimes waiting up to seven additional months for treatment. Although our study did not assess the reasons for the gap between discussions with an HCP and HFpEF diagnosis and between HFpEF diagnosis and treatment for some of the patients in the most common pathway in our study, these could be due to a variety of factors, including the ordering of clinical/laboratory tests, access to specialists, or cost/insurance coverage.

Most PCPs in this study recognized that they should support the weight loss efforts of their patients; however, most have not received formal training in obesity management. Most PCPs in our survey also reported explaining the negative effects that excess weight has on overall health (90%) and on HFpEF (84%) to their patients with HFpEF and obesity. PCPs reported predominantly recommending lifestyle interventions (93%) as a treatment for patients with HFpEF and obesity, but many studies indicate that, due to the lack of formal training in obesity management, PCPs may not be well equipped to counsel patients on appropriate interventions targeting lifestyle behaviors [28–30].

There is evidence that weight loss interventions are successful in preventing heart failure [15, 17–19]. Prescriptive physical activity, for instance, could substantially improve exercise capacity, quality of life, and some indicators of cardiac diastolic function in patients with HFpEF [31]. A 2×2 randomized clinical trial of caloric restriction and aerobic exercise training (vs. attention control) in patients with HFpEF showed that caloric restriction alone can improve symptoms and exercise capacity [5]. Nevertheless, additional studies are needed to determine the most appropriate intervention for patients with established HFpEF, which can then be implemented into clinical practice guidelines [3, 14, 16].

Our study found that PCPs are likely to utilize pharmacologic therapies for treatment of obesity; therefore, they would benefit from awareness of medications with favorable effects on body weight that also have advantageous effects on cardiovascular health. Two notable medication classes include sodium glucose cotransporter-2 (SGLT-2) inhibitors and glucagon-like peptide-1 receptor agonists. Both classes include drugs that demonstrate favorable effects on weight and reduce the risk of major adverse cardiovascular events in patients with type 2 diabetes. Within the SGLT-2 inhibitor class, there are also drugs that reduce hospitalization for heart failure and reduce the risk of cardiovascular death in patients with heart failure [32, 33].

Our study suggests that by raising awareness of HFpEF among PCPs, ensuring PCPs facilitate timely referrals to specialists, and educating PCPs about the diagnostic pitfalls for HFpEF in patients with obesity, PCPs may be better prepared to intervene early to prevent the development of HFpEF and subsequent cardiovascular events in patients with obesity.

Limitations

There are several limitations to this study. Data were self-reported by patients with HFpEF and obesity and by PCPs, who may be influenced by their own perceptions. The diagnosis of HFpEF was not independently validated. Most survey respondents who were PCPs self-identified as specializing in obesity management, which may limit generalizability of our results. Patients and PCPs did not represent matched pairs, and any discordance between patient and PCP responses may reflect real differences between the populations surveyed rather than differences

in perception between PCPs and patients or overall trends in the patient journey. Patients who engaged in the survey may represent a more informed group than the broader population of patients with HFpEF and obesity, thereby limiting generalizability. Recall bias may also be a limitation, particularly for the patients surveyed. Additionally, the relatively small sample sizes may limit the ability to generalize the findings to the larger population of patients in the US with HFpEF and obesity, as well as the HCPs who treat them. Data were collected in September of 2020 and perceptions of care could have impacted by the COVID-19 pandemic. Since our study was conducted, additional research on the efficacy of SGLT-2 inhibitors, specifically, has been released [34]; however, because this information was not available at the time of study design, the questionnaire did not list cardioprotective medications such as SGLT-2 inhibitors as pharmacologic treatment options from which participants could choose.

Conclusions

Obesity is a well-established risk factor for HFpEF, and its prevalence among patients with HFpEF is significant. Unfortunately, low patient and PCP understanding of the risk of HFpEF in patients with obesity often leads to delayed diagnosis and treatment. PCPs are pivotal in referring patients to cardiologists and therefore must have a high index of suspicion for HFpEF in patients with obesity, particularly in those with symptoms of breathlessness or exercise intolerance. Given the severity and poor prognosis of HFpEF, a comprehensive, multidimensional approach to prevention and treatment is paramount and should include lifestyle modifications, increasing physical activity, and pharmacological therapy. PCPs must play a crucial role in engaging patients in obesity management, and efforts must be made to provide additional training and support to improve patient outcomes.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12875-024-02549-4.

Supplementary Material 1

Supplementary Material 2

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Author contributions

AH and AS contributed to the design of the study. CC, MM, JB, AH, AS, and SJS all had access to the study data, interpreted the data, critically reviewed each draft, decided where to submit the manuscript, and approved the final version for publication.

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This study was funded by Novo Nordisk Inc. (Plainsboro, NJ, USA) and employees (AH and AS) played a role in the design, analysis, and interpretation of the study.

Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

All participants provided informed consent prior to completing the survey and could withdraw at any time, and participants who completed the entire survey received a modest monetary incentive. The study protocol was submitted to the Western Institutional Review Board for ethical approval and was determined to qualify for exemption status because sufficient protections were in place to protect the privacy of subjects and to maintain the confidentiality of data. The study and data accumulation were in conformity with all country, federal, or state laws, and the study adhered to the tenets of the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

CC is a speaker for Novo Nordisk, Lilly, and Boeringher Ingelheim (BI). He serves on the advisory board and as a consultant for Novo Nordisk, Lilly, BI and Sanofi. MM is a Consultant/Advisory Board Member for Novo Nordisk and Boehringer Ingelheim. JB is a consultant to Abbott, American Regent, Amgen, Applied Therapeutic, AstraZeneca, Bayer, Boehringer Ingelheim, Bristol Myers Squibb, Cardiac Dimension, Cardior, CVRx, Cytokinetics, Edwards, Element Science, Innolife, Impulse Dynamics, Imbria, Inventiva, Lexicon, Lilly, LivaNova, Janssen, Medtronics, Merck, Occlutech, Novartis, Novo Nordisk, Pfizer, Pharmacosmos, Pharmain, Roche, Sequana, SQ Innovation, 3live, and Vifor. AH and AS are employees of and shareholders in Novo Nordisk Inc. (Plainsboro, NJ, USA).SJS reports receiving research grants from the National Institutes of Health (U54 HL160273, R01 HL127028, R01 HL140731, and R01 HL149423), AstraZeneca, Corvia Medical, and Pfizer; and consulting fees from Abbott, AstraZeneca, Alleviant, Amgen, Aria CV, Axon Therapies, Bayer, Boehringer-Ingelheim, Boston Scientific, Bristol-Myers Squibb, Cyclerion, Cytokinetics, Edwards Lifesciences, Eidos, Imara, Impulse Dynamics, Intellia, Ionis, Lilly, Merck, Metabolic Flux, MyoKardia, NGM Biopharmaceuticals, Novartis, Novo Nordisk, Pfizer, Prothena, Regeneron, Rivus, Sardocor, Shifamed, Tenax, Tenaya, Ultromics, and United Therapeutics.

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