Austin Cardiology

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Austin Publishing Group

Research Article

Obesity and Heart Failure in a Health Area

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Received: August 24, 2019; **Accepted:** October 04, 2019; **Published:** October 11, 2019

Abstract

Objective: To analyze the relationship of the Body Mass Index (BMI) with heart failure in a health area.

Method: Observational descriptive study of the 161 patients who had been diagnosed in the Health Area between January 2014 and December 2016.

Among other demographic, clinical and analytical data, the BMI was analyzed based on weight and height at the first visit to the unit, using the formula: weight (in kilograms)/square of height (in meters). Once obtained, the relationship between BMI and 2-year survival was evaluated. Four subgroups of patients were analyzed, based on their BMI, based on the criteria defined by the World Health Organization (WHO) in 1999 (Technical Report Series, No. 854, Geneva: 1999): low weight (BMI < 20.5), normal weight (BMI of 20.5 to < 25.5), overweight (BMI of 25.5 to < 30) and obesity (BMI ≥ 30).

Statistical analysis was carried out using the statistical package SPSS® 24.0 for Windows. The association between BMI as a continuous variable and 2-year mortality.

Results: Of the participants, 81 were obese (50.8%), being 33 men and 48 women. The average age of the obese is 80.32 +/- 9.23 years.

The main causes of heart failure in 62.2% had diagnosed some type of heart disease, being: 29.2% Ischemic heart disease, 46.6% cardiac arrhythmias and 20.5% valvulopathies.

BMI as a continuous variable was significantly associated with mortality (p < 0.001), age (0.002), ischemic disease (0.001), gender (0.004), hypertension (0.002), diabetes (0.003) and dyslipidemia (0.004). The relation of BMI with the use of Digoxin, As a Diuretics and Spironolactone treatments has also been seen with higher BMI plus utilization. BMI is also associated with the number of admissions, greater number of concomitant chronic diseases and mortality.

The scores obtained in the MLWHFQ quality of life questionnaire at the initial visit; the patients with low weight were those who obtained the highest score, which corresponds to a worse quality of life. There were no significant differences between the scores obtained by patients of normal weight, overweight and obese, although these showed a tendency to obtain a higher score.

Conclusions: BMI has been shown to be associated with mortality, ischemic disease, sex, hypertension, diabetes and dyslipidemia in patients with heart failure.

Introduction

The changes in the diet and the increase of the sedentary progressive and generalized own of our times have brought about a progressive increase of the incidence and the prevalence of the obesity in the population. General [1]. This increase has a heterogeneous geographical distribution and mainly affects western countries, both the United States [2] and Europe are being victims of this epidemic. According to the Register of the Spanish Society for the Study of Obesity (SEEDO) [3] between 1999 and 2000, the prevalence of obesity (Body Mass Index [BMI] ≥ 30) in the adult Spanish population was 14.5%, predominantly among women, and increased with age, up to 20-30% of those over 55 years.

Obesity is a known independent risk factor for heart failure [1] (CHF) that has reached epidemic proportions: the World Health Organization estimates that more than one billion adults worldwide are overweight and 300 million of them are clinically obese The incidence and prevalence of obesity and heart failure are so high that it is not uncommon to find both disorders in the same patient. In fact, several cohorts of patients with heart failure have revealed that 15-35% of these patients are obese and that 30-60% have overweight problems [2]. Epidemiological studies have clearly shown a close relationship between obesity and increased risk of Cardiovascular Disease (CVD) and mortality in the general population.

Discovering the relationship between obesity and heart failure is proving complex. A recent epidemiological study, derived from the Framingham Heart Study, clearly indicates that obesity and overweight are very predictive variables of subsequent clinical heart

Citation: Tarraga Lopez PJ, Sadek MI, Madrona Marcos F, Simon MA, Villar Inarejos MJ, Tarraga Marcos ML. Obesity and Heart Failure in a Health Area. Austin Cardiol. 2019; 4(1): 1020.

failure [1]. Although obesity causes abnormalities in diastolic and systolic function and is supposed to increase the risk of mortality in patients with established heart failure, our group and others have shown that, paradoxically, BMI is inversely related to long-term mortality in patients with chronic heart failure [2,4,5-11]. However, it is important to note that BMI is not the only conventional risk factor for CVD that presents a paradoxical association in the clinical outcomes of patients with heart failure. High concentrations of low density lipoproteins, as well as total cholesterol, have also been associated with a survival advantage in heart failure. These systematic findings on various risk factors for CVD in patients with heart failure justify the use of the term reverse epidemiology [12-15].

Our objective was to analyze the relationship between BMI and the evolution of Heart Failure during a 2-year follow-up in patients with heart failure treated on an outpatient basis in our health area by Primary Care Physicians and Nurses, assess whether this relationship was affected by the number of hospital readmissions and, finally, assess whether the BMI has an influence on the quality of life, since there are discrepancies in the publications in this regard.

Methods

Descriptive observational study of the 161 patients who had been diagnosed in the Health Area with a population over 14 years of 15,000 inhabitants, between January 2014 and December 2016, those who had BMI at the first visit were analyzed and of his vital situation after 2 years of follow-up. The criterion for inclusion in the unit was heart failure as the main diagnosis of the patient. Among other demographic, clinical, and analytical data, BMI was analyzed based on weight and height on the first visit to the unit, using the formula: weight (in kilograms)/square of height (in meters). Once obtained, the relationship between BMI and 2-year survival was evaluated. Four subgroups of patients were analyzed, based on their BMI, based on the criteria defined by the World Health Organization (WHO) in 1999 (Technical Report Series, no 854; Geneva: 1999): low weight (BMI < 20.5), normal weight (BMI of 20.5 to < 25.5), overweight (BMI of 25.5 to < 30) and obesity (BMI ≥ 30).

Statistical analysis was performed using the SPSS® 24.0 statistical package for Windows. The association between BMI as a continuous variable and 2-year mortality has been analyzed using the Mann-Whitney U test and the Kruskal-Wallis test for those without normal distribution. The logistic regression has been used to calculate the Odds Ratio (OR). In the multivariable logistic regression analysis [16] mortality and readmissions at 1 and 2 years have been introduced as a dependent variable, and as independent variables, BMI (as a continuous variable), age, sex, the etiology of heart failure, the presence of diabetes and high blood pressure and the treatments received (beta blockers, Angiotensin Conversion Enzyme Inhibitors [ACEI] or Angiotensin II Receptor Antagonists [ARA-II], loops diuretics, spironolactone, digoxin and statins). The method used was "by conditional backward steps".

The relationship between the different established BMI groups with readmissions and mortality at 1 and 2 years was analyzed using the χ^2 test (linear by linear association for the joint analysis of the four groups) or by the Fisher test, in function of the number of patients. Comparisons between groups have been made using the χ^2 test for categorical variables and the Kruskal-Wallis test for continuous variables, after checking that they had no normal distribution.

Table 1: Clinical characteristics of the patients.

Insuf Cardiac evolution medium time	23,5 months
HTA	86%
Diabetes	54%
Hyperlipemia	63%
Tobacco	15%
BMI1	30,89
TAS1	130,58
TAD1	70,25
FC1	73,89
CT	154,65
TG	115,94
LDL	81,30
HDL	48,72
Glycemia	105,21
Hgbglicada	6,25
Na	140,08

The quality of life of the patients was evaluated using the Minnesota Living With Heart Failure Questionnaire [15] (MLWHFQ), previously used in Spain [16], during the study inclusion visit.

The MLWHFQ consists of [21] questions whose objective is to find out to what extent heart failure affects the physical, psychic and socioeconomic aspects of patients' lives; the questions refer to signs and symptoms of heart failure, social relationships, physical and sexual activity, work and emotions; The range of possible answers for each question ranges from 0 (no) to 5 (very much), so that the higher the score, the worse the quality of life.

The study has been carried out in compliance with the personal data protection law and in accordance with the international clinical research recommendations of the Helsinki Declaration of the World Medical Association.

Results

161 patients diagnosed with HF in our Health Zone have participated. Average age 81.24 +/- 9.59 years (average age/standard deviation), 54% are women.

Of the participants 81 were obese (50.8%), with 33 men and 48 women. The average age of the obese is 80.32 +/- 9.23 years.

The main causes of Heart Failure in 62.2% were diagnosed with some type of heart disease, being: 29.2% Ischemic Heart Disease, 46.6% Cardiac Arrhythmias and 20.5% Valvulopathies.

Tables 2 and 3 show the clinical characteristics and the treatments received by the patients.

Mortality at 2 years of follow-up was 19.1%.

BMI as a continuous variable was significantly associated with mortality ($p < 0.001$), age (0.002), ischemic disease (0.001), sex (0.004), HT (0.002), Diabetes (0.003) and dyslipidemia (0.004) Table 2.

Table 2: Clinical characteristics based on body mass index (% percentages).

	BMI (-18,5)	BMI1 (18,5-25)	BMI2 (25.1-30)	BMI3 (+30,1)	p
Age	67,4 +/-6,2	73,2+/-7,1	82,6 +/-5,8	84,5+/-6,7	**< 0,002**
Man	80%	65%	45%	32%	**< 0,004**
Ischemic Cause	27,5%	64,5%	57%	48%	**< 0,001**
HTA	11%	18%	30%	41%	**< 0,002**
Diabetes	12%	13%	28%	47%	**< 0,003**
Dislypemia	16%	18%	30%	44%	**< 0,004**

Table 3: Treatments based on body mass index (absolute number).

	Low weight	Normal weight	overweight	obesity	p
Beta blockers	14	16	46	24	NS
IECA ó ARA II	8	14	31	47	NS
Spironolactone	5	12	34	49	**< 0,002**
Digoxin	0	0	45	55	**< 0,006**
Diurétics handle	14	10	23	53	**< 0,001**
Statins	10	21	34	35	NS

Table 4: Income, Mortality, causes and Chronic diseases (% Percentages).

	Low weight	Normal weight	overweight	obesity	p
Hospital income in 1 year	8%	12%	42%	48%	**< 0,001**
Hospital income in 3 years	7,5%	11,5%	30%	51%	**< 0,003**
Mortality	0	7%	47%	46%	**< 0,001**
Concomitant chronic diseases	5%	8%	25%	62%	**< 0,001**
Respiratory infection as a cause of income	0	8%	22%	0	**NS**
Cardiac Decompensation as a cause of Income	5%	21%	32%	52%	**< 0,003**

BMI has also been seen to be related to the use of Digoxin, As a Diuretics and Spironolactone treatments with a higher BMI plus utilization Table 3.

BMI is also associated with the number of admissions, higher number of concomitant chronic diseases and mortality Table 4.

After adjusting for age, sex, etiology, hypertension, diabetes, and the different treatments received, the BMI remained as an independent predictor of heart failure (OR = 0.92 [0.88-0.97]) Table 5, which This means that, after adjustment, the risk of heart failure due to any cause is greater than 8% for each 1-point increase in BMI.

The scores obtained in the MLWHFQ quality of life questionnaire at the initial visit; the patients with low weight were those who obtained the highest score, which corresponds to a worse quality of life. There were no significant differences between the scores obtained by normal weight, overweight and obese patients, although these showed some tendency to obtain a higher score Table 6.

Discussion

Obesity is a common cardiovascular risk factor and often ignored by doctors. Obesity is associated with several cardiovascular diseases and is linked not only to coronary heart disease, but also to abnormal heart rhythm and ventricular function. This association is given by multiple mechanisms, and not only through hypertension, diabetes

Table 5: Multivariable logistic regression analysis (by conditional backward steps).

Variables that remain in the model	OR	IC del 95%
Age	1,35	1,21-1,40
Diabetes	2,47	1,31-3,61
BMI	0,92	0,88-0,99
Beta blockers	0,64	0,25-0,74
Estatinas	0,38	0,27-0,77
IECA o ARA-II	0,39	0,25-0,87

ARA-II: Angiotensin II Receptor Antagonists; LVEF: Left Ventricular Ejection Fraction; ACEI: Angiotensin Conversion Enzyme Inhibitors; BMI: Body Mass Index.

Table 6: Quality of Life Score according to MLWHFQ questionnaire.

	Low weight	Normal weight	overweight	obesity
Average score	23	21	34	43

mellitus or dyslipidemia. The diagnosis of obesity should include measurements of total content and distribution of body fat. Although obesity management is difficult, comprehensive obesity management can be favorable [1-4,17-19].

Extreme obesity is a known risk factor for heart failure. It is not known, however, if overweight and lower degrees of obesity are also risk factors for CHF.

In our study, an incidence of 1% CI is observed, which although it is in accordance with other published studies, are lower figures than other national studies that report incidents of 5%, being able to justify this difference due to infra diagnosis or poor diagnostic coding. In the clinical history [1-3].

This study investigates the relationship between body mass index and the incidence of CHF in patients in a Health Area. BMI was evaluated as a continuous variable and as a categorical variable (underweight below 18.5, normal value, 18.5 to 24.9; overweight, 25.0 to 29.9; obesity, 30.0 or more).

During the follow-up period (which was 2 years on average), an incidence of CHF of 161 patients was observed. Of the participants 81 were obese, with 33 men and 48 women. The average age of the obese is 80.32, while in the non-obese it was 81.24 years. After adjustment for the established risk factors for CHF, it was observed that there was an increase in the risk of CHF of 5% in men and 10% in women for every 1 increase in the body mass index. Compared to individuals with normal BMI, the risk of CHF in obese patients doubled. A gradual increase in the risk of CHF was seen as the BMI increased.

It is appreciated that the increase in body mass index is associated with an increased risk of CHF. In view of the high prevalence of obesity, strategies to promote optimal body weight can reduce the incidence of heart failure.

Although the risk ratio of CHF in overweight men did not reach statistical significance, analyzes evaluating BMI as a continuous variable support the existence of a continuous gradient of CHF risk as BMI increases in both sexes. The minor effect of BMI on the risk of CHF in patients with HBP is noteworthy. The lack of effect of BMI on the risk of CHF in patients with heart attack should be interpreted with caution given the small sample size [20-21].

Three previous community studies also reported an increased risk of CHF with an increase in BMI. The strength of the association, the gradual increase in the risk of CHF as BMI increases, the demonstration of a temporal sequence (the increase in BMI precedes the development of CHF) and the consistency of the results in multiple analyzes suggests a causal relationship between the increase in BMI and CCI. There are several plausible mechanisms for such association. Increased body mass is a risk factor for AHT, diabetes mellitus and dyslipidemia; All these factors increase the risk of myocardial infarction, an important etiology of CHF. In addition, HBP and diabetes independently increase the risk of CHF. Increased BMI is associated with an altered VI remodeling, possibly due to increased hemodynamic overload, neurohormonal activation and increased oxidative stress. Recently the possibility of a direct effect of obesity on the myocardium has been postulated by demonstrating cardiac steatosis and lipoapoptosis in animal models of obesity [22-28].

There is a statistically significant relationship between the number of chronic diseases and hospital admissions or mortality, which is confirmed by other studies that speak of high mortality and its complex management due to the frequency of comorbidities [29-31].

65% have between 4 and 6 associated chronic diseases observing: HTA (95%), Diabetes (42.2%), Dyslipidemia (68.9%), Tobacco (16.1%), Obesity (49.1%) and Neoplasms (13.7%). These data confirm the Nagarajan [32] study in which 40% of patients have 5 or more associated health problems that negatively affect their prognosis, the most important being: HTA (55%), diabetes (31%) and COPD (26%), are also frequent: hypercholesterolemia, atrial fibrillation (AF), renal failure, cerebrovascular disease and dementia.

While this study presents 62.2% of patients diagnosed with heart disease: Ischemic heart disease (29.2%), Cardiac arrhythmias (46.6%) and Valvulopathies (20.5%), other studies [33-40] in addition to IC.

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Austin Cardiol - Volume 4 Issue 1 - 2019
ISSN: 2578-0913 | www.austinpublishinggroup.com

Citation: Tarraga Lopez PJ, Sadek MI, Madrona Marcos F, Simon MA, Villar Inarejos MJ, Tarraga Marcos ML. Obesity and Heart Failure in a Health Area. Austin Cardiol. 2019; 4(1): 1020.