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Anthropometric variables and physical activity as predictors of cardiac cachexia

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Abstract

Background: This study explored the frequency of cardiac cachexia in Mexican patients, the role of anthropometric variables as predictors of its development and its association with food intake and physical activity. *Methods:* Seventy three patients with systolic heart failure were included in the study. Cardiac cachexia was defined as weight loss of >6.0% in 6 months. Anthropometric data, physical activity and dietary intake were evaluated by a 3-day questionnaire at the beginning of the study and 6 months later. *Results:* After 6 months of follow up, 14 (19%) patients developed cachexia with a mean weight loss of 12.1 ± 3.4%. Significant decrease in the anthropometric variables were observed in patients which developed cachexia except in the waist to hip ratio, which increased in these patients due to bigger diminish of hip circumference than in the waist one. The subjects which developed cachexia had significant less physical activity after 6 months (− 6.9%) in comparison with the non cachexic group. Reported energy intake did no differ among groups. Patients with cardiac cachexia showed greater prevalence of obesity and overweight, a high body fat percentage and a low arm circumference. *Conclusions:* Cardiac cachexia development was not related with low energy intake or increase in the total energy expenditure (explained by the physical activity). The only variable related to cachexia development was lower physical activity.

Keywords: Cardiac cachexia; Anthropometric changes; Physical activity; Heart failure

1. Introduction

It has been widely known that severe heart failure is associated with progressive weight loss and emaciation [1–3], this phenomenon has been named cardiac cachexia and appears in the 10% or 15% of patients with HF [4].

Subjects with cardiac cachexia show disorders in the three compartments of the body composition: lean, fat and bone tissue; this has been related to the heart failure severity degree and to the neurohormone and immune disorders which are shown in this kind of patients [5–8]. In addition to lost of muscular mass, there have been found muscular atrophy mainly in patients with New York Heart Association functional classes III and IV (68% of patients with heart failure) [9,10]. The risk of mortality and morbidity increases in these patients, and a third part of them are hospitalized every year [11]. Anker and Coats found in 171 patients with chronic heart failure that cachexia is a mortality risk factor at 18 months, independently of age, functional class, ejection fraction, peak Vo_2 and sodium levels [12].

It has been suggested as a probable mechanism for the development of cardiac cachexia an imbalance between the energy intake and the nutrition requirements due to: an inadequate intake (anorexia), intestinal malabsorption or an elevated basal metabolic rate [13].

To determine the presence of cardiac cachexia, Freeman and Roubenoff [2] suggested as criterion documented loss of at least 10% of lean body mass. Unfortunately this definition has little use in the medical practice due to high difficulty to evaluate body composition as routine study, that is why Anker and Coats [3] have suggest to identify these patients using the percentage of weight loss (>7.5% in 6 months).

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Nevertheless, the presence of edema, ascitis and fluctuations in fluid retention, frequent in this kind of patients, could complicate the detection of little body mass loss and hide the non voluntary weight loss [13]. Measurement of anthropometric variables in the upper part of the body (arm circumference and tricipital skinfold), usually free of fluid retention, could be an option to detect changes in the body composition in combination with weight and height.

In the present study, we obtained the frequency of cardiac cachexia in Mexican patients as well as anthropometric changes and its association with the changes in energy intake and physical activity during 6 months of follow up.

2. Material and methods

2.1. Study population

A total of 73 patients with systolic heart failure were included consecutively between January and December 2002. The diagnosis of systolic heart failure was based on the result of left ventricular dysfunction obtained by an echocardiography study at least 6 months before. Patients with: renal failure, uncontrolled dysthyroidism, hepatic insufficiency, unstable ischemic heart disease (instable angina and/or myocardial infarction, myocardial revascularization procedure, coronary angioplasty and/or surgical revascularization within the past 3 months), acute arrhythmias, heart failure secondary to chemotherapy and suspicious of tumor activity or AIDS were excluded. At the beginning of the study all patients were hemodynamically stable, free of edema, hepatomegaly or ascitis and were taking two or more of the following medications at the high-dose tolerance: diuretics ($n=57$; 95%), angiotensin-converting enzyme inhibitors ($n=47$;78%), beta-blockers ($n=51$; 85%), antagonists of angiotensin receptors AT1 ($n=14$; 23%), calcium antagonists ($n=5$; 8%), digital ($n=31$; 52%), oral nitrates ($n=30$; 50%) and digoxin ($n=3$; 6%).

Patients with cardiac cachexia were defined as those subjects who showed weight loss of at least 6.0% six months after the study initiation [14]. Fourteen patients (6 women and 8 men) were classified as cachectic and 59 as non-Cachectic (23 women and 36 men).

2.2. Anthropometry

At baseline and 6 months later anthropometric measurements were made in accordance with the reference manual of anthropometric standardization [15], all subjects wore little clothing and were barefoot.

2.2.1. Total body weight

The subject was standing, steady, in the middle of the platform, with the body weight evenly distributed between both feet, in front of the gauge, still and without any support. Measuring was taking at the 0.1 kg closer and two consecutive measurements must coincide with 0.1 kg.

2.2.2. Height

For this measurement a SECA stadiometer graduated in cm, was used. The subject was placed standing, with the back to the stadiometer and in front of the examiner, being aware of the steady position, heels together, feet tips lightly separated, arms at the sides and sight to the front. Heels, gluteus, shoulders and head get in contact with the vertical segment of the stadiometer, connecting the middle line of the sagittal and the middle line of the vertical segment of the stadiometer was review. Measurement was recorded to the nearest 0.1 cm.

2.2.3. Body Mass Index (BMI)

This index was calculated by dividing total body weight (kilograms) to the squared standing height (square meter). By this index patients were classified in low body weight (BMI ≤ 19), normal body weight (BMI 20–25), overweight or obesity (BMI>25).

2.2.4. Midarm circumference

The subject stayed standing, arms placed at the sides parallel to trunk and palms toward inside. The mean point of the arm was localized between the tip of the acromion and olecranon process. With the arm in relax and the elbow extended and hanging resides the trunk, the tape (Gulick) was placed around the arm in perpendicular form at the mean point. With the tape adhered to the skin but not too tight, a 0.1 cm. closer was registered. Using the midarm circumference, the arm muscle area and circumference were estimated as indicators of muscular mass and fat free mass [16].

2.2.5. Waist and hip circumferences

For these measurements the subject stayed standing with both feet lightly separated and weight distributed in both feet. Waist circumference was taken in the mean point between the last rib and the iliac crest in a horizontal plane. For the hip circumference the person in charge must recline besides the subject in a way that the level of maximum extension of the buttocks could be seen in order to place the non flexible tape around the buttocks in a horizontal plane. The circumferences were recorded to the nearest 0.1 cm. The waist to hip ratio was calculated.

2.2.6. Skinfolds

The sinkfolds (bicipital, tricipital, subscapular and suprailiac) were measured from the left side with a Lange plicometer. The location of the subcutaneous fat was made through a pinch, with the forefinger and the thumb, placing the plicometer in a perpendicular way 1 cm. under them. The reading was taken 3 s after placing the plicometer and was registered at the 2 mm closer and two consecutive measurements must coincide inside 4