Assessment of Three Activity Questionnaires in Patients with Heart Failure

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The activity questionnaire most frequently used in heart failure, the New York Heart Association Classification, does not correlate well with peak oxygen uptake. The correlation of this variable with other activity questionnaires was analyzed in 83 patients (69 with heart failure and 14 control patients), 61.5 ± 11 years old, who were interviewed and classified according to the Canadian Cardiovascular Society Classification. The Dyspnea-Fatigue Index and functional capacity according to the Specific Activity Questionnaire were determined for each patient. Subsequently, the treadmill cardiopulmonary exercise test (Naughton) was performed and the following correlations with peak oxygen uptake were found: Canadian Cardiovascular Society, r = –0.39; Dyspnea-Fatigue Index, r = 0.44; Specific Activity Questionnaire, r = 0.38. p < 0.001 for all three. The Dyspnea-Fatigue Index yielded the best correlation, although it was only slightly better than the Canadian Cardiovascular Society Classification, which is easier to obtain.

Key words: *Heart failure. Exercise. Oxygen*

Evaluación de tres cuestionarios de actividad en pacientes con insuficiencia cardíaca

El cuestionario de actividad más utilizado en la insuficiencia cardíaca, la clasificación de la New York Heart Association, no tiene una buena correlación con el consumo pico de oxígeno. Con el objetivo de analizar la relación de esta variable con otros cuestionarios de actividad, se interrogó a 83 pacientes (69 con insuficiencia cardíaca y 14 controles) de 61,5 ± 11 años, clasificándoles según la Sociedad Cardiovascular Canadiense, de los que se obtuvo el índice de disnea-fatiga y su capacidad funcional según el Cuestionario de Actividades Específicas. A continuación, se realizó ergoespirometría en tapiz rodante (Naughton), encontrándose las siguientes correlaciones con el consumo pico de oxígeno medido: Sociedad Cardiovascular Canadiense, r = –0,39; índice de disnea-fatiga, r = 0,44; Cuestionario de Actividades Específicas, r = 0,38; todas, p < 0,001. Se concluye que el índice de disnea-fatiga consigue la mejor correlación, aunque sólo es ligeramente superior a la clasificación de la Sociedad Cardiovascular Canadiense, más fácil de obtener.

Palabras clave: *Insuficiencia cardíaca. Ejercicio. Oxígen*

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INTRODUCTION

There are several classifications in the cardiological literature that group patients with dyspnea in functional degrees, which is useful for their clinical management.

The best known of these classifications are those of the New York Heart Association (NYHA)[1] and Canadian Cardiovascular Society (CCS).[2] Later, others been have published that try to improve the correlation with peak oxygen consumption (VO_2 p): the specific activity scale of Goldman,[3] the index of dyspnea-fatigue (IDF) of Yale University,[4] the Activity Status Index of Duke University[5] and, finally, the Specific Activities Questionnaire (SAQ).[6]

The purpose of this study was to evaluate some of these functional classifications (CCS, SAQ and IDF) in a series of outpatients with heart failure, and to correlate scores with VO_2 p.

PATIENTS AND METHOD

Patients

Patients diagnosed as heart failure (Framingham criteria)[7] with at least one hospital admission were

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ABBREVIATIONS

NYHA: New York Heart Association.
CCS: Canadian Cardiovascular Society.
IDF: index of dyspnea-fatigue of Yale University.
SAQ: Specific Activities Questionnaire.
VO_2 p: peak oxygen consumption

included. Exclusion criteria included patients with aortic stenosis, hypertrophic cardiomyopathy, inability to walk (disabling arthrosis or lower limb amputation, residual stroke, severe intermittent claudication, etc.), chronic airway obstruction, hyperdynamic heart failure, complete left bundle branch block or ventricular pacemaker associated to ischemic heart disease, angina pectoris, or myocardial infarction in the last 3 months. In addition, a group of control patients without a history of heart failure and with an ejection fraction (EF)>0.5 in the echocardiogram was included to increase the number of cases of NYHA classes I-II.

The study included 83 patients (69 with heart failure and 14 controls), mean age 61 years, 66% men (Table 1). Most of the patients had dilated cardiomyopathy (61 [73.5%] with an EF<0.5), CCS functional class II-III, and sinus rhythm.

TABLE 1. **Clinical characteristics**

Variable	Mean±standard deviation	Range of values
N	83	
Age, years	61.5±11.08	34-85
Sex (M), n (%)	55 (66.3)	
BMI (kg/m2)	28.6±4.6	19.2-42.1
Cause, n (%)	DCM I 24 (28.9)	
	DCM ISCH 20 (24.4)	
	DCM AHT 11 (13.2)	
	DCM ALC 4 (4.9)	
	DCM MI 2 (2.4)	
	AHT 2 (2.4)	
	AoI 1 (1.2)	
	MI 1 (1.2)	
	Others 4 (4.9)	
	Non-CHF 14 (16.8)	
EF	0.42±0.17	0.19-0.85
Rhythm, n (%)	SR 49 (74.2)	
	AF/AFL 14 (21.2)	
	Other 3 (4.5)	
CCS, n (%)	I 9 (10.8)	
	III 52 (62.7)	
	III 21 (25.3)	
	IV 1 (1.2)	
IDF	6.76±2.36	3-12
SAQ (METS)	4.9±1.35	2-7.5
VO2 p, mL/kg/min	15.5±4.3	6.4-26.4
Duration of effort, min	9.58±4.62	1.9-24.6

The rhythm data of 66 patients are tabulated. ALC indicates alcoholic; SAQ, specific activities questionnaire; CCS, Canadian Cardiovascular Society; AF/AFL, atrial fibrillation/atrial flutter; AHT, arterial hypertension; I, idiopathic; AoI, aortic insufficiency; CHF, congestive heart failure; IDF, index of dyspnea-fatigue of the University of Yale; MI, mitral insufficiency; BMIm, body mass index; ISCH, ischemic; DCM, dilated cardiomyopathy; SR, sinus rhythm; M, men; VO2 p, peak oxygen consumption.

METHOD

Patients were interviewed in baseline conditions and classified into one of the 4 grades of CCS classification.[2] Next, the IDF[4] was obtained; the IDF score consisted of 3 components (magnitude of the task, rate of execution, and functional limitation), each graded from 0 (minimum) to 4 (maximum). The final score ranged from 0 to 12. Finally, patients were interviewed about the SAQ list of activities.[6] This questionnaire, a list of 13 tasks with a known energy consumption in METS, is conceived in English as a self-administered questionnaire. To our knowledge, it has not been validated for use in Spanish, which is why we administered it as an interview. We replaced the questions about «moderate gardening work like weeding or raking leaves» and «pushing an electrical or gasoline-powered lawnmower over level land» (unusual activities in our hospital area) with «masonry jobs (building walls), automobile maintenance, cleaning glass» and «painting with a brush, mopping floors, dancing,» respectively, which have a similar energy consumption.[8] The most important activity in terms of energy consumption that the patient could carry out was recorded.

After the interview, an echocardiogram was made (Toshiba SSH 140) to measure the EF (Teicholz method or the monoplane ellipsoid in a 4-chamber apical plane if segmental contractility disturbances existed). Likewise, ergospirometry was carried out (Marquette MAX 1 treadmill, Naughton protocol), measuring VO_2 p and CO_2 production (CPX Express, Medgraphics). The respiratory ratio=1 was surpassed and the test was detained for exhaustion.

Statistical analysis

Continuous variables are given as the mean and deviation standard, with a range of values. The correlation between VO_2 p and the values of the 3 classifications (Pearson test if both variables were normal, Spearman when some did not have a normal distribution) was analyzed. The SPSS 10.0 statistical program was used.

TABLE 2. **Correlations with VO_2 p**

Variables	R	*P*
CCS	–0.39	<.001
IDF	0.44	<.001
SAQ	0.38	<.001

VO_2 p indicates peak oxygen consumption; CCS, Canadian Cardiovascular Society; IDF, index of dyspnea-fatigue of Yale University; SAQ, specific activity questionnaire.

RESULTS

The results of all the classifications correlated significantly with VO_2 p (Table 2). The CCS grade had a moderate level of correlation (–0.39) (Figure 1), similar to the correlation obtained with SAQ (0.38) (Figure 3). The IDF had the best correlation (0.44) (Figure 2).

DISCUSSION

The classification most often used[9,10] to evaluate the functional grade of patients with dyspnea is the NYHA classification[1] of 1964. Another much used classification is that of the CCS[2] of 1972, which requires more effort, with questions about city about city blocks walked and number of flights of stairs climbed. These classifications group patients into 4 functional classes and show a discrete correlation with VO_2 p, with correlation coefficients between –0.28 for NYHA[11] and –0.58 for CCS.[5]

Later classifications have attempted to improve the correlation with VO_2 p. The Specific Activity Scale of Goldman (1981)[3] tried to describe the functional level of patients more precisely, interrogating them about their capacity to carry out activities with a known energy consumption, although it continues to group patients in 4 classes and its correlation with VO_2 p is still suboptimal (r=0.67;[5] r=0.356).

The index of dyspnea-fatigue of Yale University (1984)[4] consists of a score from 0 to 12, which shows a moderate correlation with the duration of effort (r[Pearson]=0.37).

In 1989, the Activity Status Index of Duke University was published,[5] a self-administered questionnaire with 12 questions that assigns a score for various physical activities that a patient can carry out comfortably, then obtains a final index. The correlation with VO_2 p was r=0.58.

The latest questionnaire on physical activity to date is the Specific Activity Questionnaire (1994),[6] which was correlated with VO_2 p in 1996 (r=0.71).

Our results indicate that all the questionnaires had a discretely significant correlation with VO_2 p, particularly the Yale IDF, with r=0.44, which is somewhat higher than the value communicated in the

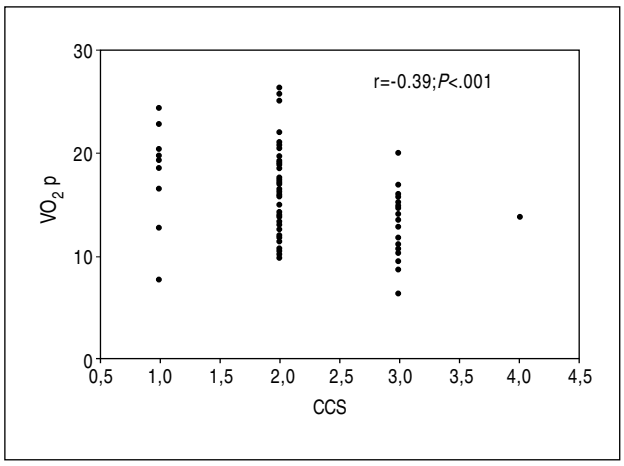

Fig. 1. Scatter diagram of the variables peak O_2 consumption (VO_2 p) and classification of the Canadian Cardiovascular Society (CCS). The Spearman correlation coefficient is shown.

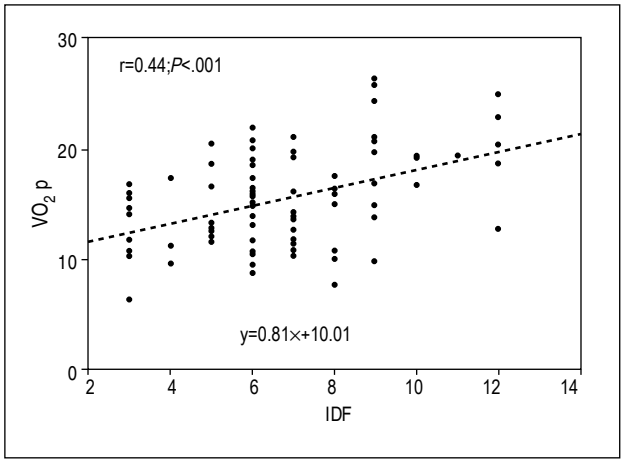

Fig. 2. Scatter diagram of the variables peak O_2 consumption (VO_2 p) and index of dyspnea-fatigue of Yale University (IDF). The linear regression and Pearson correlation coefficient are shown.

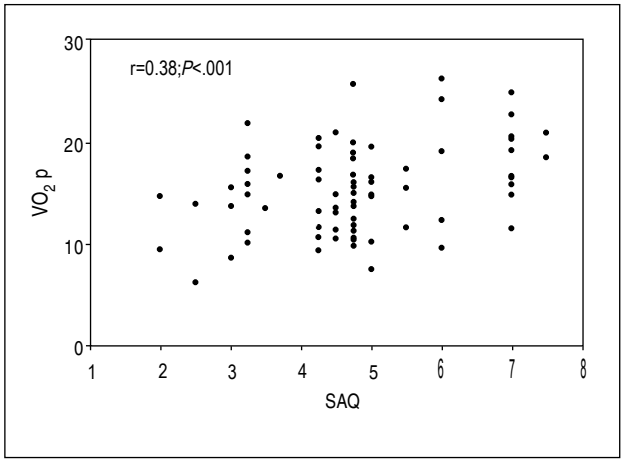

Fig. 3. Scatter diagram of the variables peak O_2 consumption (VO_2 p) and Specific Activity Questionnaire (SAQ). The Spearman correlation coefficient is shown.

reference study (r=0.37),[4] although in this study IDF was correlated with duration of effort.

We obtained worse coefficients of correlation than have been reported previously with the CCS classification. The interviews were made by several experienced clinical cardiologists, so we think that these results reflect the performance of this clinical questionnaire in practice.

The low coefficient of correlation (0.38) obtained with the SAQ is noteworthy, compared with the figures cited in the reference study (0.71). Even after changing two groups of activities in the original questionnaire to reflect daily life in Spain more closely, we observed that the questionnaire contains several questions (5 out of 13) about specific domestic or professional tasks. This may explain why a predominantly masculine group of patients of about 60 years have difficulties in answering these questions since they never carry out these activities. This could also explain the discrete correlation with VO_2 p.

The Yale IDF measures the capacity for effort and the impact of congestive heart failure on the occupational or non-occupational activities of patients. In our series, the best correlation was obtained with VO_2, probably because it is the most «continuous» index of the three indices most studied and because it is based on activities that most patients have: climbing stairs, walking uphill, personal hygiene, etc. One disadvantage of the scale is that it is more difficult to obtain than the NYHA or CCS grades. In addition, the degree of correlation is only slightly better than the correlation obtained with the SCC classification.

CONCLUSIONS

1. The 3 activity questionnaires studied correlated moderately but significantly with VO_2 p.

2. The best correlation was obtained with the IDF of Yale University, although this index is more troublesome to obtain and only slightly better than the CCS classification, which is much simpler in conception.

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