



## Original article

## Assessment of functional capacity in fibromyalgia. Comparative analysis of construct validity of three functional scales

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## ABSTRACT

**Objective:** To compare the construct validity of three functional capacity questionnaires in patients with fibromyalgia.

**Patients and methods:** Transversal multicentric study of 301 patients from fifteen rheumatology outpatient clinics in Spain. Scores of Health Assessment Questionnaire (HAQ), Fibromyalgia Health Assessment Questionnaire (FHAQ) and the physical function scale of the Fibromyalgia Impact Questionnaire (PF-FIQ) were compared with extreme groups of patients defined by four external indirect measures: 6Min Walk Test, a modified Borg Fatigue Scale, Lumbar Spine Flexion Test and Patient Global Passive Mobility Assessment. Standardized differences were determined and correlation coefficients were calculated between the three questionnaires scores.

**Results:** All three questionnaires showed good construct validity, but the results obtained with the PF-FIQ were poorer. Correlations between HAQ and FHAQ were very high (0.92), but correlations between these two questionnaires and PF-FIQ were only moderate (0.59).

**Conclusions:** HAQ and FHAQ are more valid measures of functional capacity than the PF-FIQ. HAQ could be substituted by FHAQ in some settings because of its shorter format (only 8 items).

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### Evaluación de la capacidad funcional en fibromialgia. Análisis comparativo de la validez de constructo de tres escalas

## RESUMEN

**Objetivo:** Comparar la validez de constructo de tres cuestionarios de capacidad funcional en pacientes con fibromialgia.

**Pacientes y métodos:** Estudio multicéntrico transversal: 301 pacientes procedentes de consultas externas de reumatología de 15 centros en España completaron los cuestionarios Health Assessment Questionnaire (HAQ), Fibromyalgia Health Assessment Questionnaire (FHAQ) y la escala defunción física del Fibromyalgia Impact Questionnaire (FF-FIQ), y se compararon sus puntuaciones en grupos extremos de capacidad funcional definida por las medidas externas: test de 6 minutos marcha, test de fatiga de Borg, test de flexibilidad lumbar y evaluación global de la movilidad del paciente. Se calcularon las correspondientes diferencias estandarizadas. Finalmente, se determinaron coeficientes de correlación entre las puntuaciones de los tres cuestionarios.

**Resultados:** Los tres cuestionarios mostraron una aceptable validez de constructo, pero los resultados del FF-FIQ fueron inferiores. La correlación entre HAQ y FHAQ fue muy elevada (0,92), y solamente moderada entre estos dos y el FF-FIQ (0,59).

**Conclusiones:** HAQ y FHAQ miden más adecuadamente la verdadera capacidad funcional de los pacientes que el FF-FIQ. El FHAQ, por su brevedad (sólo 8 ítems) podría sustituir al HAQ en algunas ocasiones.

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## Introduction

Fibromyalgia (FM) is characterized not only by chronic widespread pain, but also by a variety of symptoms that impair the physical and psychological health of patients. One of the most worrying aspects of this deterioration is the loss of the patients' functional capacity. Potential consequences are the loss of patient autonomy and, regarding the patients' job, the corresponding impact on economy and costs.<sup>1</sup>

Therefore we agree with other authors that the assessment of FM should be multidimensional,<sup>2,3</sup> including an assessment of functional capacity, usually through self-administered questionnaires. The most commonly used in our area are the *Health Assessment Questionnaire* (HAQ)<sup>4</sup> and the physical function scale included in the *Fibromyalgia Impact Questionnaire* (FIQ-FF).<sup>5</sup> In addition, a group of researchers has proposed the *Fibromyalgia Health Assessment Questionnaire* (FHAQ),<sup>6</sup> a questionnaire of only eight items (Appendix 2) derived from the HAQ.

After a review of the literature, we found no comparative studies on the psychometric properties of these three functional capacity questionnaires, nor other studies that confirm the validity of the FHAQ.

Criterion validity is a fundamental psychometric property of any measuring instrument that has a gold standard with which to be compared; for example, if one wanted to validate a questionnaire for the diagnosis of generalized anxiety disorder, the diagnosis by a psychiatrist could be employed.<sup>7</sup> In the case of functional capacity, as in the case of pain or quality of life, there is no evidence that could be considered in this way. In these cases the "construct validity" is of particular relevance, whose study involves defining *a priori* the construct to be assessed, in this case the functional capacity, depending on their relationship with other variables.<sup>7</sup>

Thus, the aim of this paper is to perform a comparative study of the construct validity of the three questionnaires mentioned above, by comparison with a panel of external indirect measures, which were previously considered as related to functional capacity. Ultimately, it we wish to explain which of the three questionnaires best measures the true functional capacity of patients.

## Patients and methods

This is a cross-sectional study involving patients from outpatient rheumatology clinics in 15 centers in Spain (ICAF project). We included consecutive men and women over 18 years of age, diagnosed with FM according to ACR criteria,<sup>8</sup> between January and April 2007. We considered as Exclusion criteria: disabling diseases, cardiopulmonary or other illnesses, morbid obesity, inflammatory rheumatic diseases and unstable psychiatric diseases. We also excluded those patients reporting disability claims, litigation or seeking any type of compensation. The study protocol was approved by the principal authors' hospital clinical research ethics committee.

Patients completed a battery of questionnaires that included the Spanish version of the FIQ and HAQ.<sup>9-11</sup> The physical function scale of the Spanish version of the FIQ is composed of 10 items and is scored as the original version.<sup>5</sup> The HAQ comprises 20 items and eight corrective questions. The remaining corrective questions that relate to equipment used by rheumatoid arthritis patients were eliminated because they have no utility in patients with FM. The scoring system used was one recommended by its author.<sup>12</sup> The FHAQ is composed of eight items (Appendix 2), all taken from the HAQ, and is scored by calculating the average of their corresponding items.<sup>6</sup>

The physical examination included the following external measures that were considered indirectly related to the functional capacity: 1) 6min walking test (T6MM), measured in meters; 2) fatigue scale modified by Borg (Borg) of 11 points was applied just after the T6MM, where "0=no effort" (no fatigue during the completion of the

walk test), and "10=maximum stress", 3) test for lumbar flexibility (TFL), in centimeters, and global assessment of passive mobility of the patient (EGMP), which explores the mobility of shoulders, hips and the three segments of the spine and is scored on a 11-point scale where "0=normal mobility" and "10=limitation in the five regions explored". A more detailed description of these measures can be found in other studies.<sup>10,13,14</sup>

## Statistical analysis

"The construct" defined *a priori* for this study was that patients with a greater degree of disability are those who walk less meters in the T6MM, report more fatigue in the Borg test, have a reduced lumbar mobility and have more limited areas regarding passive mobility in the EGMP. Thus, we established subgroups of patients with extreme scores in each of the four external measures: 1) "Subgroup of worse functional capacity", composed by patients in percentile  $\leq 25$  in the T6MM and/or the TFL and/or percentile  $\geq 75$  on the Borg test and/or EGMP and 2) "Subgroup of better functional capacity", composed by patients in percentile  $\geq 75$  in T6MM and/or the TFL and/or percentile  $\leq 25$  in the Borg test and/or EGMP. We analyzed whether the scores of each of the three questionnaires were significantly different in each of the subgroups for a better or worse functional capacity by using the Student's t test. To compare the magnitude of the differences between these scores, standardized differences were calculated for each of the questionnaires (standardized difference= $[(P<0=25-P\geq 75)]$ /standard deviation).

Additionally, we calculated the Pearson correlation coefficients between the scores of the three questionnaires and between the questionnaires and each of the four external measurements.

## Results

We included 301 patients with FM (10 men and 291 women) with a mean age of  $48.7\pm 8.5$  years. The scores of the questionnaires and external measures are shown in Table 1.

The scores of the three questionnaires were significantly different between the subgroups of poor and better functional capacity (Table 2). The magnitude of difference was similar between HAQ and FHAQ and of both were higher than that of FF-FIQ when T6MM, the Borg test and EGMP were applied (Table 2). In the TFL, the magnitude of the difference between the scores of the three questionnaires was similar. The study of correlations between the scores of the questionnaires and the four external measurements showed similar results, confirming the inferiority of the FF-FIQ (Table 3).

The correlation coefficients between the three questionnaires were: HAQ vs FHAQ, 0.92 vs FF-FIQ HAQ, 0.59; FHAQ vs FF-FIQ, 0.59. All correlations were significant ( $P<.001$ ).

**Table 1**  
Questionnaire and indirect functional capacity external measure statistics

Questionnaire	n	Mean	Standard deviation	Range
<b>Questionnaire</b>				
FF-FIQ	301	4.85	2.21	0-9.99
HAQ total	300	1.43	0.58	0-2.750
FHAQ	300	1.19	0.59	0-2.500
<b>External measures</b>				
T6MM, meters	301	362.26	119.46	80-932
BORG	301	4.66	2.16	0-10
TFL, centimeters	300	14.27	7.78	0-63
EGMP	301	4.23	2.49	0-10

BORG indicates Borg modified fatigue scales; EGMP, global evaluation of passive mobility of patients; FF-FIQ, physical function aspect of the *Fibromyalgia Impact Questionnaire*; FHAQ, *Fibromyalgia Health Assessment Questionnaire*; HAQ, *Health Assessment Questionnaire*; T6MM, 6 minute walking test; TFL, lumbar flexibility test.

**Table 2**  
Standardized differences of the scores of the questionnaires between the extreme groups of functional capacity (better functional capacity vs worse functional capacity)

	HAQ (mean±SD)	FHAQ (mean±SD)	FF-FIQ (mean±SD)
<b>T6MM</b>			
Percentile ≤25	1.71±0.48	1.46±0.53	5.21±2.17
Percentile ≥75	1.21±0.54	0.94±0.51	4.30±1.93
P value of the difference	<.001	<.001	.007
Standardized difference*	0.86	0.87	0.41
<b>BORG</b>			
Percentile ≤25	1.13±0.61	0.91±0.56	4.00±2.17
Percentile ≥75	1.72±0.43	1.44±0.54	5.54±1.99
P value of the difference	<.001	<.001	<.001
Standardized difference*	1.01	.91	.69
<b>TFL</b>			
Percentile ≤25	1.60±0.54	1.42±0.55	5.56±1.86
Percentile ≥75	1.27±0.57	1.03±0.55	4.28±2.25
P value of the difference	<.001	<.001	<.001
Standardized difference*	0.56	0.65	0.58
<b>EGMP</b>			
Percentile ≤25	1.19±0.59	0.94±0.56	4.13±2.39
Percentile ≥75	1.72±0.45	1.50±0.52	5.60±1.93
P value of the difference	<.001	<.001	<.001
Standardized difference*	0.91	0.95	0.66

BORG indicates fatigue score modified by Borg; EGMP, global evaluation of patient passive mobility; FF-FIQ, physical function score of the *Fibromyalgia Impact Questionnaire*; FHAQ, *Fibromyalgia Health Assessment Questionnaire*; HAQ, *Health Assessment Questionnaire*; SD, standard deviation; T6MM, 6 minute walking test; TFL, lumbar flexibility test.

\*Standardized difference: [(mean score of the questionnaire in percentile ≤25–mean score of the questionnaire in percentile ≥75)]/standard deviation scores of the questionnaires in the total sample.

**Table 3**  
Correlation between the scores of the autoapplied questionnaires and the indirect external measures of functional capacity

	HAQ	FHAQ	FF-FIQ
<b>T6MM</b>			
Pearson correlation coefficient	–0.299	–0.314	–0.147
Significance, P	<.001	<.001	=.010
<b>BORG</b>			
Pearson correlation coefficient	0.426	0.444	0.287
Significance, P	<.001	<.001	<.001
<b>TFL</b>			
Pearson correlation coefficient	–0.236	–0.223	–0.237
Significance, P	<.001	<.001	<.001
<b>EGMP</b>			
Pearson correlation coefficient	0.360	0.338	0.213
Significance, P	<.001	<.001	<.001

BORG indicates fatigue score modified by Borg; EGMP, global evaluation of patient passive mobility; FF-FIQ, physical function score of the *Fibromyalgia Impact Questionnaire*; FHAQ, *Fibromyalgia Health Assessment Questionnaire*; HAQ, *Health Assessment Questionnaire*; T6MM, 6 minute walking test; TFL, lumbar flexibility test.

**Discussion**

In the field of FM, more importance has been given to the evaluation of pain, fatigue and psychological changes than to the assessment of functional capacity, which is often grouped within broader concepts such as “quality of life” or “health status”.<sup>2,3</sup> However, the functional capacity itself has a great importance as it is, in our experience, the main concern of patients who are limited in the performance of activities of daily living that they consider as vital. The frustration this

causes is compounded by a misunderstanding of the environment motivated by the difficulty of objectifying functional impairment, unlike what happens in other diseases such as rheumatoid arthritis or osteoarthritis in which functional impairment seems more justified by the existence of demonstrable organic changes. These organic changes can be demonstrated.

Another consequence of functional impairment is the loss of working days with its associated economic impact. Patients with FM have a work disability rate four times greater than that of other workers.<sup>15</sup> In this sense, self-perceived functional capacity as assessed by HAQ, has proven to be an independent statistical predictor of economic cost in a multiple regression model in patients with fibromyalgia.<sup>1</sup>

From a psychometric perspective, the HAQ, the FHAQ and the FF-FIQ showed acceptable construct validity as measures of functional capacity, being able to discriminate between patients with extreme scores for each of the four external measures proposed by the panel. The comparison of the difference magnitude in this analysis showed similar results between HAQ and FHAQ which in turn were higher than those of FF-FIQ in three of the four measures used.

The correlation between HAQ and FHAQ was excellent, however, the correlation of both with the FF-FIQ was only moderate. This suggests that information on functional capacity provided by the FF-FIQ is qualitatively different from that provided by the other two questionnaires and less valid as our results suggest. The reasons for this inferiority may be found in the scoring system of the physical function component of FIQ (always, often, sometimes, never) since, according to the authors’ experience, patients often confuse ‘never because unable to do’ with ‘never’ because I do not have the habit of doing so’ (especially the item referred to the use of public transport).<sup>10</sup> The scoring system of HAQ and FHAQ (without difficulty, some difficulty, with difficulty, unable to do so) do not offer this possibility of error and seems more appropriate (Annex 1).

A review of the literature shows that the correlations between FF-FIQ and T6MM on the one hand and between HAQ,<sup>16</sup> on the other hand, as well as the tests of gait and lumbar flexibility<sup>17</sup> are comparable to those presented in this study. Apart from its initial study,<sup>6</sup> the FHAQ has only been used by one group of researchers,<sup>18</sup> however there were no comparisons between their scores and other external measures. Furthermore, in no case has there been a study of the comparative validity between HAQ and FF-FIQ.

As limitations of this study, we may point the non-inclusion of the physical function subscale of SF-36, used less in our area and which showed several problems in a previous study.<sup>6</sup> In addition, the fact of including measures not sufficiently validated such as EGMP or the modified version of the Borg test. However, the behavior of these scales in this study was very similar to T6MM, which is widely known and validated.<sup>13,16,17</sup>

In conclusion, we consider that HAQ and FHAQ and have a superior construct validity, that is, they more accurately measure the true functional ability of patients than the FF-FIQ. The FHAQ, due to its brevity (only 8 items) could replace the HAQ on occasions when we seek a multidimensional assessment of patients using a small number of items.

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## Conflict of interest

This study was funded by the pharmaceutical company Pfizer.

## Annex 1

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## Annex 2

Spanish version of *Fibromyalgia Health Assessment Questionnaire* (FHAB).\*

Marque, por favor, con una cruz la respuesta que mejor indique su capacidad para realizar las siguientes actividades durante la ÚLTIMA SEMANA. (Sólo debe marcar una respuesta en cada pregunta).

Durante la <u>última semana</u> , ¿ha sido usted capaz de...	Sin dificultad	Con alguna dificultad	Con mucha dificultad	Incapaz de hacerlo
	↓	↓	↓	↓
1) Vestirse solo, incluyendo abrocharse los botones y atarse los cordones de los zapatos? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) Levantarse de una silla sin brazos?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) Lavarse y secarse todo el cuerpo?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) Coger un paquete de azúcar de 1 Kg de una estantería colocada por encima de su cabeza?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) Agacharse y recoger ropa del suelo?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Hacer los recados y las compras?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Entrar y salir de un coche?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) Hacer tareas de casa como barrer o lavar los platos?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\*Taken from the Spanish version of the Health Assessment Questionnaire (HAQ)<sup>11</sup>

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