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RESEARCH

Comparison of tools for assessing fatigue in patients with heart failure

Comparação de instrumentos para avaliar fadiga em pacientes com insuficiência cardíaca

Comparación de instrumentos para evaluar la fatiga en pacientes con insuficiencia cardíaca

Eliane Nepomuceno[I], Luma Nascimento Silva[I], Débora Cristine Prévide da Cunha[I], Rejane Kiomi Furuya[II], Marcus Vinicius Simões[III], Rosana Aparecida Spadoti Dantas[I]

[I] *Universidade de São Paulo, Ribeirão Preto College of Nursing. Ribeirão Preto, São Paulo, Brazil.*
[II] *Instituto Federal do Paraná. Londrina, Paraná, Brazil.*
[III] *Universidade de São Paulo, Medical School of Ribeirão Preto. Ribeirão Preto, São Paulo, Brazil.*

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ABSTRACT

Objective: To compare the distributions of measurements of the Dutch Fatigue Scale (DUFS), Dutch Exertion Fatigue Scale (DEFS), and Fatigue Pictogram tools, according to the New York Heart Association (NYHA) Functional Classification and left ventricular ejection fraction (LVEF). **Method**: Methodological, cross-sectional study with 118 patients with heart failure. Variance analysis, Pearson's correlation, and Fisher's exact tests were carried out, with a significance level of 0.05. **Results:** There was an increase in the DUFS and DEFS means with worsening of the NYHA-FC ($p<0.001$, for both tools). Correlations among the LVEF resulted in positive and weak magnitude for the DEFS ($r=0.18$; $p=0.05$) and for the DUFS ($r=0.16$; $p=0.08$). Just the item A on the Fatigue Pictogram had an association with the NYHA-FC ($p<0.001$) and the LVEF ($p=0.03$). **Conclusion:** Three tools detected worsening in fatigue levels according to the illness severity assessed by the NYHA-FC.

Descriptors: Heart Failure; Cardiovascular Nursing; Fatigue ; Surveys and Questionnaires; Nursing.

RESUMO

Objetivo: Comparar as distribuições das medidas dos instrumentos *Dutch Fatigue Scale* (DUFS), *Dutch Exertion Fatigue Scale* (DEFS) e Pictograma de Fadiga, segundo a Classe Funcional da *New York Heart Association* (CF-NYHA) e a Fração de Ejeção do Ventrículo Esquerdo (FEVE). **Método**: Estudo metodológico, transversal, com 118 pacientes com insuficiência cardíaca. Foram realizados os testes Análise de Variância, Correlação de Pearson e Exato de Fisher, com nível de significância de 0,05. **Resultados:** Houve aumento nas médias do DUFS e do DEFS com a piora da CF-NYHA ($p<0,001$, para ambos os instrumentos). As correlações entre a FEVE foram de positiva e fraca magnitude para o DEFS ($r=0,18$; $p=0,05$) e para o DUFS ($r=0,16$; $p=0,08$). Somente o item A do Pictograma de Fadiga teve associação com a CF-NYHA ($p<0,001$) e com a FEVE ($p=0,03$). **Conclusão:** Os três instrumentos detectaram piora nos níveis de fadiga, de acordo com a gravidade da doença avaliada pela CF-NYHA.

Descritores: Insuficiência Cardíaca; Enfermagem Cardiovascular; Fadiga; Inquéritos e Questionários; Enfermagem.

RESUMEN

Objetivo: Comparar las distribuciones de medidas de los instrumentos *Dutch Fatigue Scale* (DUFS), *Dutch Exertion Fatigue Scale* (DEFS) y Pictograma de Fatiga, según la Clase Funcional de la *New York Heart Association* (CF-NYHA), y la fracción de eyección del ventrículo izquierdo (FEVE). **Método**: Estudio metodológico, transversal, con 118 pacientes con insuficiencia cardíaca. Fueron realizados los tests Análisis de Varianza, Correlación de Pearson y Exacto de Fisher, nivel de significatividad de 0,05. **Resultados**: Hubo aumentos en los promedios del DUFS y del DEFS, empeorando la CF-NYHA ($p<0,001$ en ambos instrumentos). Las correlaciones entre FEVE fueron de magnitud positiva a débil para DEFS ($r=0,18$; $p=0,05$) y para DUFS ($r=0,16$; $p=0,08$). Solo el ítem A del Pictograma de Fatiga tuvo asociación con la CF-NYHA ($p<0,001$) y con la FEVE ($p=0,03$). **Conclusión**: Los tres instrumentos detectaron empeoramiento de niveles de fatiga de acuerdo con la enfermedad evaluada por la CF-NYHA.

Descriptores: Insuficiencia Cardíaca; Enfermería Cardiovascular; Fatiga; Encuestas y Cuestionarios; Enfermería.

CORRESPONDING AUTHOR **Rosana Aparecida Spadoti Dantas** E-mail: rsdantas@eerp.usp.br

INTRODUCTION

Heart failure (HF) is a chronic-degenerative condition that belongs to the group of cardiovascular diseases. It is a multisystemic disorder since, despite the cardiac involvement, it has an impact on the musculoskeletal system and the renal and neuro-hormonal functions resulting from the inability to pump effectively one or both ventricles in response to the body needs[1-2].

In addition, HF is characterized by periods of stability and clinical decompensation[2]. This is the natural outcome of several heart diseases that leads to complex treatment with high socioeconomic cost, since it involves spending on medications, recurring hospitalizations, some surgical indications and, in the most severe cases, heart transplant[1-2].

Fatigue, dyspnea, orthopnea, edema of the lower limbs, ascites, and palpitation are some signs and symptoms that may be present in the clinical worsening of patients with HF[1-2]. Fatigue is a frequent manifestation and is related to the adverse evolution of the illness[1]. It is an oppressive sensation and sustained by exhaustion and decreased capacity to perform physical and mental work at the usual level[3]. The worst levels indicate worst clinical prognosis and worst functional classification[1,4]. The current study opted to use the definition included in the NANDA international classification, since 1988, which was later applied to the compared tools[3].

Among the indicators for quality of care to patients with HF, especially those in outpatient follow-up, the level of physical activity and fatigue reported to carry out daily activities indicate an impact of HF and the evolution of the disease[1]. The challenge for nurses that provide care to these individuals is to assess fatigue for a better planning of nursing care, since this condition is considered a problem that has a negative impact on the quality of life and self-care capacity.

One of the tools used by nursing for assessing fatigue is the Fatigue Pictogram. Easy, fast, valid, and reliable it can be applied on general population and patients as well, including those who are weaker or have a lower educational level[5]. The Dutch Fatigue Scale (DUFS) and the Dutch Exertion Fatigue Scale (DEFS) tools, developed by the University of Groningen, Netherlands, have the objective to assess the fatigue related to heart disease and effort, respectively[6]. Both are adapted and validated for use in Brazil[7].

In clinical practice, the sensitivity of a measuring tool is important to allow the detection of differences among patients within a given clinical condition[8]. In case of patients with HF, a tool is considered sensitive if it can discriminate those with greater disease severity from those with less severity.

Based on the above considerations, the objectives of the current study were to compare the distributions of the Dutch Fatigue Scale (DUFS), Dutch Exertion Fatigue Scale (DEFS), and the Fatigue Pictogram tools, according to the New York Heart Association (NYHA) Functional Classification and the left ventricle ejection fraction (LVEF).

OBJECTIVE

To compare the distributions of the Dutch Fatigue Scale (DUFS), Dutch Exertion Fatigue Scale (DEFS), and the Fatigue Pictogram tools, according to the New York Heart Association (NYHA) Functional Classification and the left ventricle ejection fraction (LVEF).

METHOD

Ethical aspects

The research was carried out according to the norms of Resolution CNS 466/12 and approved by the Research Ethics Committee of the Ribeirão Preto College of Nursing. The objectives were presented to potential subjects in oral and written forms, and an informed consent form was signed once the subjects agreed to participate.

Study design, setting, and period

A methodological, cross-sectional study was carried out at the outpatient and nursing wards of the Cardiology Department of a university hospital in the interior of São Paulo, from September 2014 to March 2015.

Population and sample, inclusion and exclusion criteria

A consecutive, non-probabilistic sample was formed by inpatients and outpatients with a diagnosis of HF, regardless of etiology. To determine the number of participants, three factors were considered. The first was the need to obtain a minimum of 10 observations for each of the nine DEFS items, taking into account that it is considered the tool with the highest number of items when compared to the other two (eight items from DUFS and two from the Pictogram) [9]. The second factor was related to the proportional distribution of potential participants, according to four NYHA functional classifications[10]. Thus, the closest number to 90 and divisible by four was 96 (allowing 24 participants for each functional classification). The third factor taking into account was the time available to complete the study.

The established inclusion criteria were: being an adult (18 years or older), from both genders, regardless of race; being diagnosed with HF reported in the medical record, regardless of etiology, and having the LVEF assessed in the last twelve months through transthoracic echocardiogram. The referred exam was carried out by one of the physicians at the cardiology service of the institution where the study was conducted. The last echocardiogram report was chosen when there was more than one in the period of twelve months. Patients treating other illnesses that cause not heart-related fatigue were excluded; including those with a diagnosis of acute myocardial infarction or unstable angina with pain uncontrolled by medication in the last three months, obstructive valve disease, congenital heart disease, severe pulmonary hypertension, or other sever pulmonary disease. Also excluded were those who showed visual impairment that did not allow the visualization of Fatigue Pictogram images; and those with unfit clinical conditions to answer the tools and who were not conscious and guided. For temporal and spatial orientation assessment, six questions adapted from a previous tool were used[11], and those who got them wrong or did not know the answer to three or more questions were excluded.

Study protocol

Data were collected through individual interviews carried out by one of the researchers, including a consultation to patient medical records. With an average of 20 minutes each,

these interviews were conducted in the HF outpatient waiting room, while the patients waited for medical consultation. For the application of the fatigue assessment tools, three distinct sequences were used, taking into account the order of the tools to be answered: 1st sequence (DEFS, DUFS, and Fatigue Pictogram) was answered by a group of 40 patients (33.9%); 2nd sequence (DUFS, Fatigue Pictogram, and DEFS) were answered by other 40 patients (33.9%), and 3rd sequence (Fatigue Pictogram, DEFS, and DUFS) were used in 38 patients (32.2%). This procedure was aimed to allow the application of each one of the tools in first, second, and third places, so the order of the application would not have an influence on the obtained results. Each participant answered one of the sequences, which was randomly defined at the time of data collection.

The DUFS[6] tool was elaborated through the definition provided by NANDA-I and based on 12 defining characteristics for fatigue diagnosis. It assesses fatigue related to heart disease[6]. For the elaboration of the DEFS, the authors considered 62 physical activities related to fatigue and efforts, with an aim at creating a specific tool to assess fatigue related to the effort[6].

In the current study, two versions validated to Brazilian Portuguese were used[7]. The DUFS adapted version includes eight items, answered in a five-point ordinal scale, in which one (1) means that the situation does not take place and five (5) means that the situation always takes place. The total score obtained by adding the answers to the items, after an inversion of the values answered in item 6, varies from eight to 40, with higher values indicating greater intensity of fatigue related to heart disease. The DEFS adapted version has nine items that assess fatigue rate during daily activities. The answers were obtained through a five-point ordinal scale, in which one (1) means that the activity does not cause fatigue and five (5) that it is extremely fatiguing. The total score, obtained by adding the answers to the nine items, varies from nine to 45, with higher values indicating greater intensity of fatigue related to the effort.

The Fatigue Pictogram[12] was used in the version validated for Brazil[5]. The first question (Item A) assesses the intensity of fatigue in a scale that varies from zero (not at all tired) to four (extremely tired). The second (Item B) assesses the impact of fatigue varying from zero (I can do everything I normally do) to four (I can do very little). The two items are assessed separately, whereas the higher the score, the higher the sensation and the fatigue impact. In addition, in the scale of the answers there are illustrations that supplement the descriptors of the fatigue intensity and impact.

The criteria used for assessing the severity of HF were functional classification and the LVEF value. Based on the NYHA criteria for establishing the Functional Classifications[13], the current study used the self-assessment of patients related to the performance of their daily activities. To obtain this assessment, the drafting of the items of four functional classifications was changed as follows: You have no limitation to perform your physical activities. Ordinary physical activities do not cause fatigue nor palpitation or shortness of breath or chest pain (FC-I); you have a slight limitation to perform your physical activities. Ordinary physical activities cause fatigue, palpitation, shortness of breath or chest pain (FC-II); you have marked limitation to perform physical activities. Minimum efforts to perform ordinary physical activities cause fatigue, palpitation, shortness of breath or chest pain (FC-III), and you are unable to perform your physical activities without fatigue, palpitation, shortness of breath or chest pain (FC-IV). The LVEF classification was used as a discrete variable and categorized as preserved (≥ 55) or reduced (< 55) [14].

Analysis of the results and statistics

Histograms were designed to compare the distributions of the values obtained by the DUFS and DEFS tools among the four groups of patients (NYHA-FC I, II, III, and IV). To test whether the fatigue means were different among the groups of patients, Analysis of variance (ANOVA) was carried out with the scale value as response variable, and the group of patients (NYHA-FC) as the explanatory variable. When the group factor was statistically significant, multiple comparison tests for the means with *post hoc* Bonferroni's correlation method was used. To check the correlation between the measures obtained by DUFS and DEFS tools and the LVEF informed in the patient medical record, Pearson's Correlation test was used. The distributions of the answers, for the two Fatigue Pictogram questions, were compared according to the NYHA functional classifications, and the LVEF categorization (preserved or reduced) by Fisher's Exact.

Data were processed and analyzed by IBM SPSS® (Statistical Package for the Social Sciences) software, 23.0 version for Windows, except for the Fisher's Exact test, which was carried out with the R i386 version 3.0.0 software. The significance level adopted was 0.05 for all tests.

RESULTS

During the data collection period, 183 patients diagnosed with HF were invited to participate in the study. Of these, 23 refused and 42 were excluded for several reasons, such as having a diagnosis of severe pulmonary disease (n = 10); uncontrolled unstable angina (n = 2); recent myocardial infarction (n = 3); cancer (n = 2); dialytic renal failure (n = 8); chronic pain (n = 2); immunological disease (n = 9); visual impairment (n = 1); not reaching the minimum score in the assessment tool for consciousness and temporal orientation (n = 4) and one did not have clinical conditions to answer the tools. Of all 118 participants that met the eligibility criteria and agreed to participate in the study, 98 (83.1%) were in outpatient care and 20 (16.9%) were hospitalized.

In the studied group, 61.9% were men, with a mean age of 62.5 years (SD = 13.1) and 92.4% referred not having a spouse or a partner. Most did not have a paid occupation (86.4%), had low education level (mean of five years of study), and varied household income [average of R$ 1.805 (SD = 2862.00)].

Among the participants, 76.3% were hypertensive, had an average of three comorbidities besides HF, and used several drugs (median of 5; varying from 1 to 8). Regarding the 118 participants, according to the functional classification, 25 (21.2%)

were in FC-I, 30 (25.4%) in FC-II, 30 (25.4%) in FC-III, and 33 (28.2%) in FC-IV. The LVEF varied from 12% to 72% [M = 35.1%, (SD = 15.1%)]. Most (84%) had reduced LVEF (< 55). The use of implantable devices was found among 42 (35.5%) participants, as follows: definitive pacemaker (19); implantable cardiac resynchronization therapy (14), and cardioverter defibrillation (9).

Regarding the fatigue assessment, the total DUFS and DEFS mean scores were, respectively, 24.3 (SD = 8.1; median = 24, varying from 8 to 40) and 22.8 (SD = 9.2; median = 21, varying from 9 to 42). As for the Fatigue Pictogram, the distribution of the answers of the participants for item A "*How tired did you feel last week?*" was: not at all tired (20.3%), slightly tired (25.4%), moderately tired (22.9%), very tired (17.8%), and extremely tired (13.6%). For item B, "*How much the sensation of being tired prevents you from doing what you want to do?*" the answers obtained in descending order of frequency were: I can do a few things (26.3%); I can do very little (22.9%); I do what I have to do (n = 26; 22.0%); I do almost everything (19.5%), and I can do everything (9.3%).

With the increase of disease severity, shown by the progression of the NYHA-FC, the means obtained by the DUFS also increase, indicating the worsening of the fatigue referred by the patients (Figure 1). Similar results were obtained during the assessment of fatigue due to effort (DEFS) (Figure 2).

The results of the comparisons among the mean values obtained by the DUFS tool, according to the NYHA-FC, are found in Table 1. The fatigue scores o of patients in the NYHA-FC were further apart from the scores of the other three functional groups, although there is an overlap among the four groups (Table 1).

The fatigue mean values assessed by the DEFS among the groups of participants, including the (NYHA-FC) functional classification, are found in Table 2. Similar to the DUFS, only the NYHA-FC class I showed a score with a clearer distinction from the remaining groups and this can also be observed in Figure 2, in which the first group has values concentrated in lower scores.

The distributions of the answers to the two Fatigue Pictogram items, according to the self-referred NYHA-FC were sparse and, therefore, some categories were gathered in a way to facilitate result analysis and interpretation. There were statistically significant associations between the answers and the self-referred NYHA-FC ($p < 0.001$) (Table 3).

The correlations between fatigue and LVEF measurements were poor for the DUFS (r = 0.18; $p = 0.05$) and DEFS (r = 0.16; p = 0.08). There was an association between the answers of item A from the Pictogram and the LVEF ($p = 0.03$); however, no association was found in the answers from item B ($p = 0.45$).

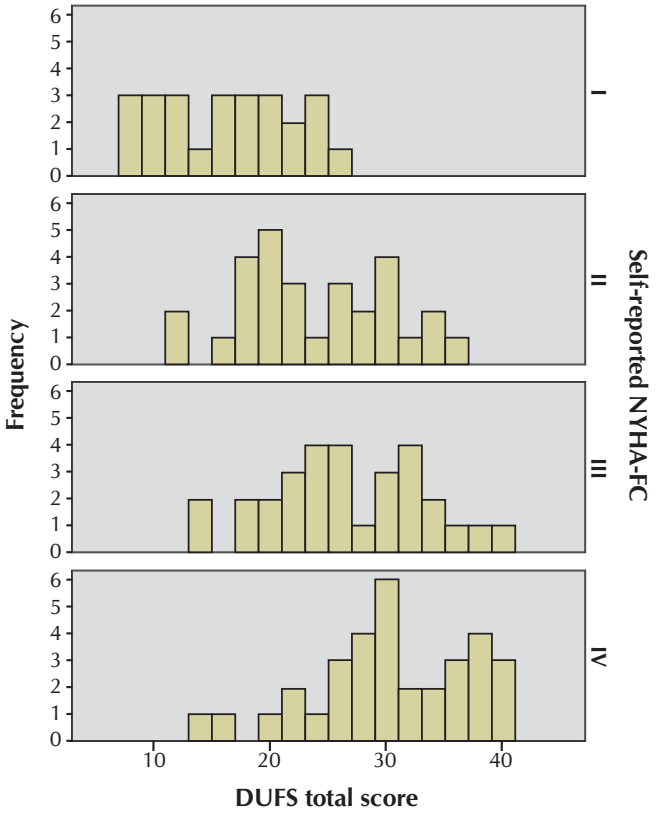

Figure 1 – Distribution of the total Dutch Fatigue Scale – DUFS tool values, according to the functional classification self-reported by patients, Ribeirão Preto, São Paulo, 2016

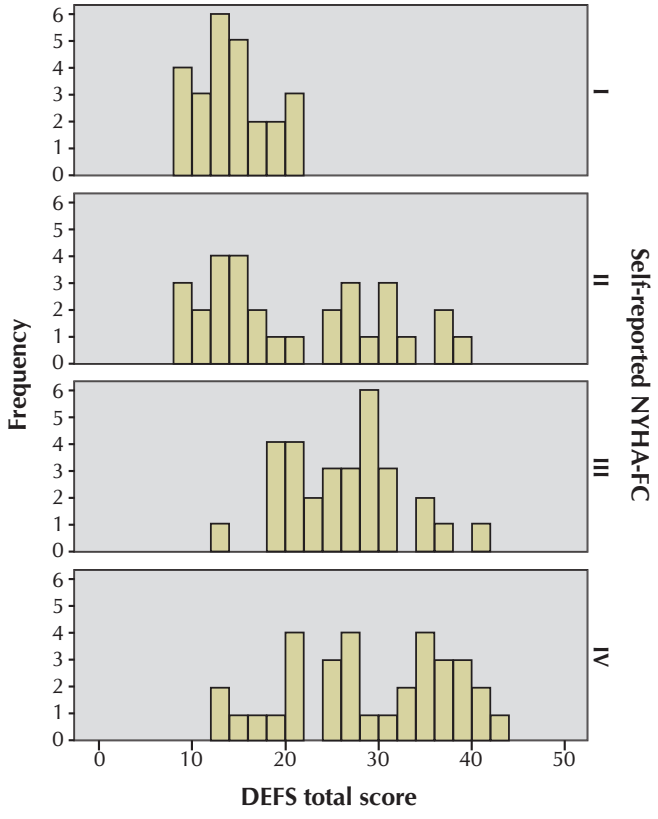

Figure 2 – Distribution of the total Dutch Exertion Fatigue Scale – DEFS tool values, according to the functional classification self-reported by patients, Ribeirão Preto, São Paulo, 2016

Table 1 – Comparison of total score means of the distribution of the total Dutch Fatigue Scale – DUFS tool values among New York Heart Association functional classifications – NYHA-FC, self-reported by the participants, Ribeirão Preto, São Paulo, 2016

Self-reported NYHA-FC*		*p***	(95%) Interval of confidence for the difference between means	
			Upper limit	Lower limit
I	II	**<0.001**	-12.14	-2.64
	III	**<0.001**	-14.96	-5.54
	IV	**<0.001**	-18.66	-9.44
II	III	0.56	-7.39	1.67
	IV	0.001	-11.09	-2.23
III	IV	0.13	-8.19	0.58

Note: NYHA-FC: New York Heart Association functional classification; **p values resulting from the post-hoc test of the comparisons of Bonferroni's multiple means.*

Table 2 – Comparison of the total Dutch Exertion Fatigue Scale – DEFS score means among the New York Heart Association - NYHA-FC functional classifications, according to the assessment of the patients, Ribeirão Preto, São Paulo, 2016

Self-reported NYHA-FC*		*p***	(95%) Interval of confidence for the difference among the means	
			Upper limit	Lower limit
I	II	0.005	-12.35	-1.49
	III	**<0.001**	-17.42	-6.56
	IV	**<0.001**	-20.19	-9.56
II	III	0.059	-10.24	0.11
	IV	0.001	-13.02	-2.90
III	IV	0.77	-7.95	2.17

*Note: *NYHA-FC: New York Heart Association functional classification; **p values resulting from the post-hoc test of the comparisons of Bonferroni's multiple means.*

DISCUSSION

The results obtained indicated that, in general, there is a relationship in the distribution of the answers, between the items of the fatigue assessment tools and the NYHA-FC self-reported by the participants.

In the studied group, the DUFS and DEFS mean scores were 24.3 (SD = 8.1) and 22.8 (SD = 9.2), respectively. Lower scores were obtained in a sample of healthy adults, 16.3 and 12.6, respectively, for DUFS and DEFS[15], as expected. The lack of national studies, using the referred tools, did not allow the comparison with other patients with HF. However, international researchers investigated the relationship between DEFS and DUFS measurements with the NYHA-FC in a sample with patients with heart disease submitted to myocardial revascularization. The NYHA-FC was obtained by evaluation of the cardiologist and was grouped in NYHA-FC I-II and NYHA-FC III-IV. They concluded that there was an association between the fatigue assessed by the two tools and the NYHA-FCs ($p < 0.001$ for both)[16].

Although it was not also possible to compare the results obtained through the Fatigue Pictogram with other studies, this tool has been considered valid and sensitive for assessing fatigue in oncologic patients[17] and with hepatopathies[18]. Chinese researchers found a rate similar to those obtained in the current study, regarding fatigue in patients with HF. Based on the patients that reported this symptom, 30% referred some difficulty to perform daily activities[19], which can be observed in 45.8% of the participants that answered that they could do almost anything or a few things due to the presence of fatigue, in the current research.

As previously mentioned in the study, fatigue has been related to the NYHA-FC: the higher the classification, the worst the fatigue. Among the 118 participants, more than 50% self-reported them in the NYHA-FC as III (25.4%) and IV (28%), and it can be noted that in these categories high levels of fatigue are reported according to the tools used. Such data show the perception of functional limitation and the impact the disease has on these individuals. Also, it can show the evolution of HF, thus helping healthcare providers to assist these patients and how to manage their treatment and nursing care, with an aim at improving quality of life and self-care capability.

Table 3 – Association of gathered answers to the questions 1 and 2 from the Fatigue Pictogram and functional classifications (FC) self-reported by the participants, Ribeirão Preto, São Paulo, 2016

Fatigue Pictogram		Self-referred NYHA-FC* (n)				*p***
		I n (%)	II n (%)	III n (%)	IV n (%)	
Item A	Not at all tired.	15 (12.8)	6 (5.1)	2 (1.7)	1 (0.8)	**<0.001**
	Slightly/moderately tired.	10 (8.5)	18 (15.2)	15 (12.7)	14 (11.9)	
	Very/extremely tired.	0 (0)	6 (5.1)	13 (11.0)	18 (15.2)	
Item B	I can do everything.	8 (6.8)	2 (1.7)	0 (0)	1 (0.8)	0.001
	I can do almost everything/a few things.	14 (11.8)	17 (14.4)	12 (10.2)	11 (9.3)	
	I just do what I have to do/I can do very little.	3 (2.5)	11 (9.4)	18 (15.2)	21 (17.9)	

*Note: *NYHA-FC: New York Heart Association functional classification; **p values resulting from the Fisher's exact test.*

The relationship between fatigue symptoms and clinical status experienced by the patient or assessed by the physician, and the evaluation of the worsening of these parameters, indicate heart failure involvement. Researchers evaluated 276 patients with HF and compared the signs and symptoms with several clinical parameters, whereas one of them was the NYHA-FC. Intense fatigue followed by extreme or generalized weakness was observed in 9.3% of FC-I patients, 14.3% of FC-II patients, 53.5% of FC-III, and 85.4% of FC-IV. Among the reported symptoms, fatigue was the sixth most frequent among FC-I patients and the seventh among FC-II patients. However, among those with FC-III and IV, fatigue was the third and the second most frequent, respectively. These results confirm the importance of assessing patients with HF, especially those with FC-III and FC-IV[9].

Nonetheless, data resulting from the NYHA classification are not always presented in a way that could identify who did the assessment (physicians or patients) and how it was carried out (whether the patients were interviewed or if they provided the answers by themselves), thus yielding unreliable results. Professionals can misinterpret the right way for using this classification. For instance, in a study that evaluated patients hospitalized because of HF decompensation in a university hospital, the authors identified in the medical records that 77% of them were classified as NYHA-FC I and II, which was incompatible with the decompensation status of the disease[20].

Study limitations

The study limitations were the impossibility to obtain the assessment of the functional capacity through the walking test, according to what has been recently proposed in the literature. The studied sample represents just one part of the population of Brazilian patients with HF, whereas most are characterized as having a low level of education and income. These characteristics of the participants could be related to the difficulty they have answering some of the items of the tools, as well as the higher percentages of answers to the DEFS and DUFS items in the categories placed at both ends of the scale.

Another aspect had to do with filling out the tools. Since this step was carried out through individual interviews, most answered the tools thoroughly. However, some of the DUFS and DEFS items were not answered. There were individuals that did not answer what was asked (i.e. items 1, 2, and 5 of DUFS). There was also the case of an item that may not have been suitable to the situation of the participant, such as the one that asked about the presence of fatigue symptom during sexual activities (item 7 of DUFS) or using a vacuum cleaner (item 7 of DEFS).

Contributions to the areas of nursing, health, or public policy

The measurements resulting from the three analyzed fatigue assessment tools showed an association with the NYHA-FC measurement among the studied participants. According to the progression of disease severity assessed by the functional classification, there was an increase in the scores of the DUFS and DEFS tools, indicating higher fatigue. As for the Fatigue Pictogram, with the worsening of the NYHA-FC of the patients, the selection of the categories related to greater fatigue intensity and impact took place.

The fatigue assessment carried out by nurses is an important parameter for care planning. In the case of outpatient care patients, worsening of this symptom may indicate the need for more frequent follow-up, whether through phone contact or home visits. In extreme situations, hospitalization for clinical control must be discussed with the medical team. For hospitalized patients, fatigue may be used as a parameter for assessing whether a patient is ready for hospital discharge.

Regarding the easy of using the three tools in health services that treat patients with HF, although it has not been registered in a systematic and standardized way according to the comments made by the participants during the interviews, it became evident that the Fatigue Pictogram was easier to understand because it included two items clearly written and with illustrations previously mentioned, which facilitated the understanding of the participants with a low educational level. Many participants had problems answering some of the DUFS and DEFS items, even after these tools had been adapted and validated for the Brazilian population in samples of patients with socio-demographic characteristics similar to the current study.

New studies will be carried out by the research group of the authors of the current study, with the aim of identifying how fatigue measures are linked to the severity of HF, according to the assessment of patients assisted in other healthcare services, such as private-sector clinics or healthcare plans, in order to widespread the results for the Brazilian population diagnosed with this disease.

CONCLUSION

The three tools showed worsening in the level of fatigue according to the increase of the disease severity assessed by the NYHA-FC. Comparing the mean values of the fatigue among the groups of patients, categorized according to the NYHA-FC level, the results were statistically significant for both tools, DUFS and DEFS. Despite the overlap among the four groups, patients in the NYHA-FC showed a score with more evident distinction than the other three functional classification groups.

Regarding the Fatigue Pictogram, patients with higher NYHA-FC reported more intensity (item A) and greater impact (item B) fatigue impact, and the association among the variables was statistically significant.

REFERENCES

1. Brake R, Jones ID. Chronic heart failure part 1: pathophysiology, signs and symptoms. Nurs Stand [Internet]. 2017[cited 2017 Feb 1];4;31(19):54-63. Available from: https://www.ncbi.nlm.nih.gov/pubmed/28094639
2. Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JG, Coats AJ, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European

Society of Cardiology (ESC). Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. Eur J Heart Fail[Internet]. 2016[cited 2017 Feb 1]18(8):891-975. Available from: https://oup.silverchair-cdn.com/oup/backfile/Content_public/Journal/eurheartj/37/27/10.1093

3. Herdman TH, Kamitsuru SE. Nanda International. Nursing Diagnoses 2015-17: Definitions and Classification. Oxford: Wiley Blackwell; 2014.
4. Brake R, Jones ID. Chronic heart failure part 2: treatment and management. Nurs Stand[Internet]. 2017 [cited 2017 Feb 1];31(20):53-63. Available from: https://www.ncbi.nlm.nih.gov/pubmed/28075307
5. Mota DDCF, Pimenta CAM, Fitch MI. Fatigue Pictogram: an option for assessing fatigue severity and impact. Rev Esc Enferm USP [Internet]. 2009[cited 2017 Jan 26];43(Spe):1080-87. Available from: http://www.scielo.br/pdf/reeusp/v43nspe/en_a12v43ns.pdf
6. Tiesinga LJ, Dassen TW, Halfens RJ. DUFS and DEFS: development, reliability and validity of the Dutch Fatigue Scale and the Dutch Exertion Fatigue Scale. Int J Nurs Stud[Internet]. 1998[cited 2017 Jan 26];35(1-2):115-23. Available from: https://www.ncbi.nlm.nih.gov/pubmed/9695018
7. Fini A, Cruz DALM. Psychometric properties of the Dutch Fatigue Scale and the Dutch Exertion Fatigue Scale: Brazilian version. Rev Bras Enferm [Internet]. 2010[cited 2017 Jan 26];63(2):216-21. Available from: http://www.scielo.br/pdf/reben/v63n2/08.pdf
8. Terwee CB, Bot SD, Boer MR, van der Windt DA, Knol DL, Dekker J, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol[Internet]. 2007[cited 2017 Apr 10];60(1):34-42. Available from: https://www.ncbi.nlm.nih.gov/pubmed/17161752
9. Albert N, Trochelman K, Li J, Lin S. Signs and symptoms of heart failure: are you asking the right questions? Am J Crit Care[Internet]. 2010[cited 2017 Apr 10];19(5):443-52. Available from: https://www.ncbi.nlm.nih.gov/pubmed/19940253
10. Pasquali L. Princípios de elaboração de escalas psicológicas. Rev Psiq Clin [Internet]. 1998 [cited 2017 Apr 10];25(5):206-13. Available from: http://bases.bireme.br/cgi-bin/wxislind.exe/iah/online/?IsisScript=iah/iah.xis&src=google&base=LILACS&lang=p&nextAction=lnk&exprSearch=228044&indexSearch=ID
11. Pfeiffer E. A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients. J Am Geriatr Soc[Internet]. 1975 [cited 2017 Jan 26];23(10):433-41. Available from: https://www.ncbi.nlm.nih.gov/pubmed/1159263
12. Fitch MI, Bunston T, Bakker D, Mings D, Sevean P. Evaluating a new clinical assessment tool: the fatigue pictogram. Can Oncol Nurs J [Internet]. 2011[cited 2017 Jan 26];21(4):205-17. Available from: https://www.ncbi.nlm.nih.gov/pubmed/22216735
13. The Criteria Committee of The New York Heart Association. Nomenclature and criteria for diagnosis of diseases of the heart and great vessels. 9th ed. Boston: Little, Brown & Co, 1994. p. 253-256.
14. Lang RM, Badano LP, Mor-Avi V, Afilalo J, Armstrong A, et al. Recommendations for cardiac chamber quantification by echocardiography in adults: an update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. J Am Soc Echocardiogr. [Internet]. 2015[cited 2017 Jan 26];28(1):1-39.e14. Available from: http://asecho.org/wordpress/wp-content/uploads/2015/01/ChamberQuantification2015.pdf
15. Mota NF, Cruz DALM, Fini A. Fatigue in adults accompanying patients in outpatient treatment. Acta Paul Enferm[Internet]. 2010[cited 2015 Jul 14];23(3):348-53. Available from: http://www.scielo.br/pdf/ape/v23n3/en_v23n3a06.pdf
16. Middel B, van der Laan BH, Stankus A, Wynia K, Jüch F, Jansen G. Construct and criterion validity of the DUFS and DEFS in Lithuanian patients with coronary artery disease. J Eval Clin Pract[Internet]. 2011[cited 2015 Jul 14];17(3):452-61. Available from: https://www.ncbi.nlm.nih.gov/pubmed/21040245
17. Danjoux C, Gardner S, Fitch M. Prospective evaluation of fatigue during a course of curative radiotherapy for localized prostate cancer. Support Care Cancer [Internet]. 2007[cited 2015 Jul 14];15(10):1169-76. Available from: https://www.ncbi.nlm.nih.gov/pubmed/17333296
18. Procópio FO, Cruz VP, Scavonec CM, Giunta L, Pestana JO, Roza BA, et al. Fatigue effects in daily life activities of kidney transplant recipients. Transplant Proc[Internet]. 2014[cited 2015 Jul 14];46(6):1745-9. Available from: http://www.transplantation-proceedings.org/article/S0041-1345(14)00372-8/pdf
19. Chen LH, Li CY, Shieh SM, Yin WH, Chiou AF. Predictors of fatigue in patients with heart failure. J Clin Nurs[Internet]. 2010[cited 2015 Jul 14];19(11-12):1588-96. Available from: https://www.ncbi.nlm.nih.gov/pubmed/20579199
20. Pelegrino VM, Silva LN, Furuya RK, Schmidt A, Rossi LA, Dantas RAS. Self-care, sense of coherence and depression in patients hospitalized for decompensated heart failure. Rev Esc Enferm USP[Internet]. 2015[cited 2017 Apr 10];49(3):388-94. Available from: http://www.scielo.br/pdf/reeusp/v49n3/pt_0080-6234-reeusp-49-03-0388.pdf