

Study of Fatigue and Associated Factors in Patients with Chronic Heart Failure

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Abstract

Background: Many factors may be involved in fatigue of patients with chronic heart failure (CHF).

Objectives: The present study was conducted to determine fatigue and associated factors in patients with heart failure.

Methods: The present descriptive-analytical study was conducted on patients with CHF admitted to Imam Sajjad hospital of Ramsar in 2014. Data collection tools included: 1) multidimensional assessment of fatigue (MAF) scale, 2) the Pittsburgh sleep quality index (PSQI), 3) the hospital anxiety and depression scale (HADS), and 4) demographic characteristics form and the hemoglobin and ejection fraction (EF) records. Data collection was done through interviews and observations.

Results: The study was conducted on 100 CHF patients with a mean age of 68.8 ± 11.7 years. Overall, 69% of the patients reported fatigue, and 60.6% claimed severe fatigue. Fatigue was found to be significantly related to sleep disorders and anxiety, but not to depression and hemoglobin. Fatigue was predominantly affected by anxiety.

Conclusions: The results of the present study showed that a high percentage of patients with CHF experience fatigue. Fatigue is a subjective phenomenon that is often less attended to and needs to be clinically assessed; to promote health care in these patients, it is required to consider factors such as mood disorders (anxiety and depression) and sleep disorders.

Keywords: Fatigue, Depression, Anxiety, Heart Failure, Hemoglobin

1. Background

Fatigue is a subjective complaint and is usually stated as a sense of constant hatred or exhaustion (1-3). The term fatigue may be experienced as a general phenomenon by both healthy and sick individuals (4), yet the term fatigue should be distinguished with a sense of tiredness since there is no balance between activity and rest in fatigue (in the other words, fatigue is not completely removed through common ways of restoring energy) (4-6). Although its exact mechanism is not clear, researchers believe that fatigue includes multiple dimensions (7, 8); physiologic and psychological dimensions could be pointed out as two examples (9). Due to these dimensions, various scales have been designed for different diseases to determine fatigue; researchers consider the aim of the study, its applicability, the impact of disease on performance etc. and choose one or some tools for the study (10, 11).

In addition to being multi-dimensional, fatigue is also multi-factorial, which means that there are several factors

responsible for fatigue occurrence (1, 2). In this regard, depression and mood disorders are factors that can cause fatigue or worsen it (2). In the study of Servaes et al. (12), a relationship was observed between anxiety, depression and fatigue, also in the study of Beyrami et al. (13), anxiety was determined as a significant factor of psychological fatigue and depression. Also in many other studies, depression (2, 14-18), stress (19) and anxiety (13, 19, 20) were reported along with fatigue. Other influential factors in fatigue include low hemoglobin (21-25) and sleep disorders (2, 25, 26). The International Institute for Health introduced fatigue as a common symptom of chronic diseases (27). Fatigue as a non-specific phenomenon is often observed in chronic diseases such as multiple sclerosis, liver diseases, adrenal and kidney failure, thyrotoxicosis, lupus, malignant diseases and congestive heart failure (28).

Heart failure is a common final route of all heart disorders, which is recognized as the most common chronic disease and one of the important causes of death among adults (29); it is also the most common cause of hospi-

talization and high health care costs are spent for these patients annually (29). Increased longevity and life expectancy lead to increased prevalence of heart diseases and finally heart failure (30, 31).

Fatigue is more likely in patients that have experienced heart failure along with decreased cardiac output, increased energy used for breathing, respiratory problems, coughing and insomnia (27), so that fatigue is one of the most common and stressful physical symptoms in these patients (29). There are conflicting studies regarding fatigue prevalence in heart failure. In a prospective study, fatigue prevalence was 16% - 91% (32) and in another study, it was reported as 88% (19). Results of the study of Ivanoglesta et al. (33) reported fatigue in 50.4% of male heart diseases and 51.2% of female heart diseases, and in the study of Rahnavard et al. (34) 54.9% of the patients of the study had present moderate fatigue and 49% had had moderate fatigue during the last month. In another study, only 5% of the patients did not report any fatigue and 9% of the patients reported fatigue following an activity (24). Fatigue was recognized as a physical activity-restricting factor (35, 36).

In the study of Zambroski et al. (37), 85% of the patients felt energy loss, which can be equal to fatigue. Fatigue can be considered as a debilitating factor in heart failure patients and it is commonly involved; it can lead to loss of social-physical ability (5) and it also influences self-care behavior to a high extent (25). In terms of rehabilitation process, fatigue is an activity restrictive factor, therefore, daily routines will be affected and patients including youth and adults are not satisfied with their physical activity (9).

Unfortunately, fatigue is amongst symptoms that are less considered (15). Patients who suffer from chronic diseases believe that fatigue is one of the outcomes of their disease and thus accept it and do not complain (5).

2. Objectives

Considering nurses' role in promoting health and developing intervention programs for promoting patients' quality of life (35), it seems necessary to pay attention to subjective issues such as fatigue in assessing and recognizing patients. Thus due to the high prevalence of fatigue in heart failure patients and since it is a multifactorial issue and has been ignored considering its assessment and recognition, and regarding the high cost and limited research in Iran, the researcher decided to conduct a study with the aim of determining fatigue and related factors in patients with heart failure during year 2014. Patients' fatigue was expected to be controlled by the medical team, especially by nurses to promote heart failure patients' quality of life to an appropriate level.

3. Methods

This descriptive-analytic study was done on patients with heart failure, who had referred to Imam Sajad (s) hospital in Ramsar during year 2014. The sample size was determined as 100, according to the study of Zambroski, in which 85% of the patients had fatigue (37); the reliability coefficient of the study was 95% and $d = 0.07$, and sampling was done through the simple random method. Samples of the study were selected by cardiologist's confirmation; they had previous diagnosis of heart failure at least for one year and they were selected after doing echo with ejection fraction (EF) of 20% - 40% (treatment with heart drugs and not having recognized diseases; mental disorders, epilepsy, multiple sclerosis, stroke, hyperthyroidism and hypothyroidism, rheumatoid arthritis, different types of inflammatory diseases and cancer, kidney and adrenal insufficiency). Data collection was done in a single stage through using a questionnaire involving; 1. demographic data and questions in regards to duration, number of drugs, frequent physician visits, and regular drug use, and 2. the Pittsburgh sleep quality index, which is a standard questionnaire (17). Questions of seven categories assessed subjective sleep quality, delay in falling asleep, sleep duration, efficiency and effectiveness of sleep and inappropriate performance and disorders during the day. Each question was scored from 0 to 3.

Total average scores of these seven categories was the tools total score, which was from 0 to 21; achieving higher score indicated lower sleep quality. In this study a score higher than six indicated inappropriate sleep quality. In the study of Zeighami et al. (38), reliability of these tools was determined as 0.80 through Cronbach's alpha.

3. Hospital anxiety and depression scale (HADS) was used for assessing the candidate's psychological state; it is a valid questionnaire, and is used for determining psychological problems in patients with heart failure (39). This questionnaire includes two anxiety and depression subcategories and each one includes seven questions. Scoring each question varies from one (the best state) to four (the worst state). Thus the probable score for depression and anxiety subcategories is 0 to 21. A score of 11 and higher in each subcategory: indicates severe disorder, 8 to 10 suggests a moderate state (moderate disorder) and 0 to 7 represents a natural psychological state. Internal reliability based on Cronbach's alpha for anxiety and depression subcategories in an Iranian sample was respectively 78% and 86% (40).

4. Multidimensional assessment of fatigue (MAF) Scale; this is a valid tool for assessing fatigue in chronic diseases, it involves five dimensions including, fatigue level, fatigue severity, distress, impairment in daily activities (house-

hold chores, bath and washing, dressing up, working outside home, visiting friends, participating in recreational activities, shopping, strolling) and fatigue duration in the last week scored from 1 to 10. A score of 1 - 3 indicates little fatigue, 4 - 7 shows moderate fatigue and 7 - 10 presents high fatigue; the total fatigue score is achieved by summing all the five dimensions (with a range of 1 - 50) and its reliability in the previous studies was 93% based on Cronbach's test (28).

Questionnaires were filled out by the researcher after obtaining permission from the University research ethics committee and patients' written satisfaction through interview and by considering patients' psychological conditions.

Questionnaire's validity, content validity and reliability, as indicated by Cronbach's alpha in the sleep questionnaire, was 87% and in fatigue, anxiety and depression was 93%.

Statistical calculations of the achieved data were done through the SPSS 17 software, using descriptive test, t-test, analysis of variance (ANOVA) and linear regression.

4. Results

The study was done on 100 patients with 20% - 40% EF. The mean age of the participants was 68.8 (\pm 11.7) years old. Most of the patients were male (54%) and illiterate (65%), and most of them were living in the city (76%) and had high blood pressure (62%). Hemoglobin standard deviation and average in females and males were respectively 11.65 \pm 1.61 and 12.13 \pm 1.41, while EF standard deviation and average in females and males were respectively 32.6 \pm 6.41 and 30.48 \pm 8.16.

Most of the patients of the study had felt tired in the last week (69%).

(Table 1 shows fatigue scores in the assessed dimensions in heart failure patients).

Most of the patients had poor sleep quality (68.1%), mild anxiety (38.5%) and mild depression (54.7%).

(Table 2 shows the mean of anxiety and depression problems along with fatigue in heart failure patients).

There was no significant relationship between appropriate and inappropriate hemoglobin and fatigue total score through the t-test.

There was no significant relationship between age and education level with all the fatigue aspects through the ANOVA test and there was only a significant difference with the life condition (living with spouse, children, etc.), and the difference was significant only during fatigue duration ($P < 0.03$). There was a significant statistical relationship between fatigue total scores, and fatigue complaints and employment status (respectively $P < 0.03$, $P < 0.05$). Also

there was a significant statistical relationship between respiratory distress and fatigue ($P < 0.00$).

Using t-test, there was only a significant relationship between gender and distress scores following fatigue ($P < 0.1$). Also there was a significant relationship between fatigue total scores with patient's follow-up and life functional disorders ($P < 0.02$ and $P < 0.000$, respectively); also there was a significant relationship between fatigue in the last week and sleep and anxiety, but there was no significant relationship with depression.

Data analysis through linear regression model showed that anxiety is one of the fatigue determining factors.

(Table 3 shows the fatigue-determining factors by using the linear regression model in heart failure patients).

5. Discussion

High percentage of the patients (69%) reported fatigue in this study. The findings of other studies also indicate high prevalence of fatigue in the range of 69 to 88% (41-43), while in the study of Sharon et al. (32), fatigue prevalence was reported as 96 to 100%.

Fatigue is one of the initial symptoms of heart failure, which is frequently observed (33). Also in a longitudinal study by Kings and Fredman, fatigue was reported to be the only symptom of chronic heart failure (44). Fatigue can be expected with decreased heart output. Considering the fact that EF of the selected samples was 20% - 40% in this study, it is possible that the other 31% that were not experiencing fatigue had higher EF.

Fatigue restricts physical activity or the ability to exercise (19) and indicated hypo perfusion to skeletal muscles in studied patients (24). In the findings of the present study, dysfunction of daily life activities was observed, also in the study by Faulk, there was a significant relationship between fatigue and patient's reduced function (45). Fatigue is considered as a limiting factor for physical activity (19), while excessive fatigue leads to reduced skeletal muscle function (46), which occurs due to increased catabolic muscle myopathy, therefore reduced activity and fatigue accompany skeletal muscle inappropriate function (19, 24, 46).

Considering average and standard deviation of age (11.7 \pm 68 years old) and impairment of daily function following fatigue, it is likely for patient's independence to be at risk and results in inappropriate impacts on patients' quality of life.

The findings of this study indicate that although most of the patients were illiterate, the majority of them consumed their drugs regularly and followed up their disease. However one of the causes of impairment of daily activi-

Table 1. The Average Fatigue Scores in the Studied Dimensions in Heart Failure Patients (n = 69)

Variable Name	Mean \pm Standard Deviation	Range	Little %	Moderate %	High%
Fatigue level	1.62 \pm 7.53	10 - 0	0	40.9	59.1
Fatigue severity	1.52 \pm 7.56	10 - 0	0	41.2	58.8
Stress following fatigue	1.73 \pm 7.51	10 - 0	1.5	41.2	57.3
Daily function disorder	2.58 \pm 7.14	10 - 0	0	29.2	70.8
Fatigue duration	5.92 \pm 36.43	50 - 0	1.5	69.1	29.4
Fatigue Total score	5.92 \pm 36.43	50 - 0	0	39.4	60.6

Table 2. Average Scores of Anxiety and Depression Problems With Fatigue Variable in all Heart Failure Patients (n = 100)

Problems	Fatigue Presence	Average \pm Standard Deviation	Range	F	t-test
Anxiety	Yes	3.79 \pm 10.82	21 - 0	0.72	P = 0.05
	No	2.6 \pm 6			
Depression	Yes	2.24 \pm 9.57	21 - 0	1.44	Lack of P = 0.23
	No	1.61 \pm 8.63			
Sleep	Yes	4.64 \pm 10.52	21 - 0	6.02	P = 0.016
	No	3.79 \pm 7			

Table 3. Fatigue Determining Factors by Using Linear Regression Model in Heart Failure Patients (n = 69)

Variable	P Value	B	teta β
Anxiety	0.4.857	1.32	P < 0.000

ties due to fatigue may be related to patient's lack of knowledge of doing exercises and activity as much as possible.

In the study of Hekmatpour et al. (47), it was observed that there is no appropriate communication between treatment team and the patient and their family. Due to fear of activity and disease severity, patients may limit their activities since researchers believe that decreased activity of the patients with heart failure is a strategy for avoiding disease symptoms such as fatigue (32).

The study of Houshmand et al. (48) indicated that patients with heart failure have a permanent inactive life without doing any exercises. Physical exercises as a part of treatment of patients with heart failure promote patients' physical function and patients' promoted quality of life can be expected by decreasing fatigue level (49). Functional status should also be considered when taking care of the patients; it may be that the patient or their family needs to be trained for promoting activities.

Oka et al. (50) in a randomized controlled trial suggested that implementing appropriate exercise program

leads to improvement of disease symptoms and patients' function; it was also effective in patients, who had little ability of doing exercises.

Another issue investigated in study was decreased hemoglobin; although decreased hemoglobin was not found among the effective factors in this study, considering fatigue multifactorial features, it is possible that hemoglobin was almost near its natural range in the samples of this study. However, decreased hemoglobin and anemia can lead to impairment of daily life function and activities. Also in the study of Falk et al. (45), fatigue in patients suffering from heart failure with anemia was higher compared with heart failure patients without anemia. Also in the study of Okonko et al. (21), anemia was reported as the determining factor of fatigue, depression and exercises intolerance, while hematocrit was 39% in the same study; depending on disease severity, anemia etiology varies in patients with heart failure. In terms of patient's anemia, it should be considered that reduced cardiac output and reduced blood circulation lead to impaired iron circulation in the blood; iron is going to be out of blood circulation and will be place in hematopoietic centers in an abnormal form.

The findings of this study indicated that there is a significant relationship between fatigue, sleep quality and anxiety in all the patients and anxiety is one of determining factors of fatigue; this is while there was no significant

relationship between fatigue and depression.

Sleep is one of the essential needs of a human being; it is necessary for conserving energy, appearance and physical well-being (50). Sleep disorders have negative impact on physical, emotional and social function of patients with heart failure (51). Results of the study of Zeighami and Re-deker also indicated that high percentage of these patients suffered from sleep disorders (38, 51).

Also in the study of Kessing et al. (25), sleep disorders and symptoms of mood disorders, independent of disease severity, were reported as the fatigue determining factors. In another comparative study, it was also clear that there is a significant relationship between fatigue factor, anxiety and depression (19). Different studies reported fatigue symptoms with depression signs in patients with heart failure (39, 45) and coronary artery (52). Also in the study of Guallar-Castillon et al. (53), 48.8% of heart failure patients had depression; the authors of this research believed that depression may prepare patients for other psychological factors and progresses the disease. Also in the study of Servaes et al. (12), the relationship between anxiety and depression was confirmed. It seems that the relationship between mood changes and depression need further research, yet researchers should also determine whether fatigue is observed in these patients along with depression (29). The EF amount and disease duration in the selected samples can be the causes of different results in this study compared to other studies, however mood changes and all the possibilities of its occurrence should be recognized in a patient; a closer examination of the patients to provide an appropriate strategy by recognizing issues such as anxiety, depression, etc., is required.

5.1. Conclusion

Close examination of the patients is required for providing optimal care services. In this regard educated nurses can provide valuable services for the patients by using their knowledge and skills in solving patients problems. However, unfortunately issues such as fatigue are less considered because of being subjective, thus some patients such as heart failure patients consider fatigue as a part of the disease and get used to it, and little by little it results in patient's dependency. Therefore, by being aware of such issues and their related factors and considering them, standard care programs can be provided. Considering that the issues of patients with heart failure are not going to be completely improved like other chronic diseases and they need proper (evidence-based) care, it is recommended to conduct studies regarding care strategies for decreasing fatigue in heart failure patients.

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