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Factors associated to sleep pattern in heart failure patients*

FATORES ASSOCIADOS AO PADRÃO DE SONO EM PACIENTES COM INSUFICIÊNCIA CARDÍACA

FACTORES ASOCIADOS AL PATRÓN DE SUEÑO EN PACIENTES CON INSUFICIENCIA CARDÍACA

Mariana Alvina dos Santos[1], Diná de Almeida Lopes Monteiro da Cruz[2], Ricardo Luís Barbosa[3]

ABSTRACT

The objective of this study was to describe sleep patterns in patients with heart failure (HF) and analyze associations between sleep and the following variables: gender, age, fatigue, fatigue on exertion, physical activity, functional class, drug therapy, dyspnea, and body mass index. The nonprobability sample consisted of 400 patients (mean age 57.8 years; 64.8% were men, average schooling of 6.1 years; 82.5% Functional Class II or III). The prevalence of poor sleepers was 68.5%, and 46.5% rated sleep as poor or very poor. Scores suggest that the bad sleeper category was associated with: female, unemployed, fatigue, fatigue on exertion, dyspnea and higher functional classes of HF. The proportion of poor sleepers among patients with HF is among the highest in chronic diseases. Dyspnea and fatigue, common symptoms of this disease, significantly increase the chance of being a bad sleeper.

DESCRIPTORS

Heart failure
Sleep
Dyspnea
Fatigue
Nursing

RESUMO

O estudo teve como objetivo descrever o padrão de sono em pacientes com insuficiência cardíaca (IC) e analisar associações do sono com as seguintes variáveis: sexo, idade, fadiga, fadiga ao esforço, atividade física, classe funcional, terapia medicamentosa, dispneia e índice de massa corporal. A amostra não probabilística foi de 400 pacientes (idade média 57,8 anos; 64,8% eram homens; escolaridade média de 6,1 anos; 82,5% em classe funcional II ou III). A prevalência de maus dormidores foi de 68,5% e 46,5% classificou o sono como ruim ou muito ruim. Escores que sugerem categoria de mau dormidor foram associados a: sexo feminino, não empregados, fadiga, fadiga ao esforço, dispneia e classes funcionais mais elevadas da IC. A proporção de maus dormidores entre os pacientes com IC está entre as mais altas nas doenças crônicas. Dispneia e fadiga, sintomas comuns a essa enfermidade, aumentam significativamente a chance de ser mau dormidor.

DESCRITORES

Insuficiência cardíaca
Sono
Dispneia
Fadiga
Enfermagem

RESUMEN

Estudio que objetivó describir el patrón de sueño en pacientes con insuficiencia cardíaca y analizar asociaciones del sueño con las siguientes variables: sexo, edad, fatiga, fatiga ante esfuerzo, actividad física, clase funcional, terapia medicamentosa, disnea e índice de masa corporal. La muestra no probabilística fue de 400 pacientes (edad media 57,8 años; 64,8% hombres, escolaridad media de 6,1 años; 82,5% en clase funcional II o III). La prevalencia de afectados por transtornos del sueño fue de 68,5%, y 46,5% clasificó su sueño como malo o muy malo. Puntajes que sugieren categoría de transtornos del sueño se asociaron con: sexo femenino, desempleados, fatiga, fatiga ante esfuerzo, disnea y clases funcionales más elevadas del IC. La proporción de afectados por transtornos del sueño entre pacientes con IC está entre las más altas en enfermedades crónicas. Disnea y fatiga, síntomas comunes en esa enfermedad, aumentan significativamente la chance de sufrir alteraciones del sueño.

DESCRIPTORES

Insuficiencia cardíaca
Sueño
Fatiga
Disnea
Enfermería

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INTRODUCTION

Changes in sleep are common among patients with heart failure (HF). Besides having a negative effect on the patients' quality of life, it is one of the most disturbing problems for this population[1-2]. Poor sleep can compromise cognition and affect one's self-care practice. Therefore, sleep disturbances may influence treatment management and increase the risk of unplanned admissions. Understanding sleep disturbances in HF is necessary in order to plan the treatment that is pertinent to the multiple dimensions of this ailment, thus contributing to a better assistance to people with HF and to improving their quality of life.

A challenge in analyzing sleep disturbances in people with HF is that the disturbed sleep pattern may be associated with symptoms particular of HF, such as fatigue, which increases the difficulty of distinguishing sleep problem symptoms from those of HF[3].

It is known that fatigue is a frequent symptom in HF, and that it is significantly related to an unfavorable evolution of the disease and it affects sleep, and contributes to psychological stress and anxiety, caused by the progression of the disease[4]. A study performed with HF patients has shown that there is a statistical association between sleep disorder and fatigue, with sleep disorder patients showing a higher intensity of fatigue and fatigue on exertion[5]. Dyspnea is also a common HF symptom, and is reported by patients as the cause of fatigue[6-7]. It is also known that breathing disorders during sleep affect heart function in HF patients[1].

A challenge in analyzing sleep disturbances in people with heart failure is that the disturbed sleep pattern may be associated with symptoms particular of heart failure, such as fatigue...

Studies have suggested there are other factors related to sleep disturbances in people with HF. They include, in addition to the symptoms of the disease, factors such as: gender, age, marital status, and other clinical variables[8-9]. As to the clinical variables, the degree of HF aggravation should be considered when analyzing sleep, as it is known that the quality of sleep is worse in higher functional classes[10].

Studies show that the sleep pattern is an important response to HF. However, there is no consistent evidence of the associations between variables and impaired sleep patterns, and few studies have examined sleep disturbances from the patients' perspective[3,8]. Furthermore, we did not find, , other studies addressing sleep in Brazilian HF patients. This is, the first study to examine sleep patterns of Brazilian HF patients. Examining the associations between variables and disturbed sleep pattern in patients with HF may provide evidence to enhance patient care and their quality of life..

The study hypothesis was that there was an association between demographics, HF characteristics, dyspnea and fatigue symptoms, drug treatment, body mass index (BMI), smoking, and physical activity and HF patients' self-report of sleep disturbances.

The objective of this study was to investigate the predictors of sleep disturbances in Brazilian HF patients.

METHOD

This cross-sectional study was performed with a non-probabilistic sample consisting of 400 patients receiving ambulatory treatment for heart failure, using individual interviews performed by the lead researcher.

Patients were included if they were at least 18 years old and where able to understand and answer the questionnaires. Patients were excluded if they had any oncological or infectious diseases affecting their overall health, endocrinal disorders (untreated diabetes mellitus and thyroid diseases), had recently undergone surgery (less than 60 days before), and those who had already been submitted to a heart transplant.

To obtain the necessary patient sample size to estimate the prevalence of poor sleepers (PSQI>5) among HF patients, a prevalence of 50% was used, with a 5% margin of error and 5% significance. This prevalence figure maximizes the size of the sample (n=384), with fixed error margin and significance, considering that prevalence estimates range considerably in the literature. For example, a study with 59 patients found a 67.8% prevalence for poor sleepers, and another, with 125 patients, found a 74.4% prevalence[11-12]. There are records of lower prevalence values, but, in these cases, other cut-off scores were used, such as 37% for PSQI scores greater than 10, and 57.5% for scores greater than 6[6,13]. Therefore, 400 patients were included to cover any eventual losses that, in the end, did not occur.

The study was approved by the Ethics Committee at the hospital involved (review number 3793) on May 12, 2009. All patients provided written consent.

Variables and instruments

The study variables included: sleep pattern, gender, age, schooling, smoking, marital cohabitation, work status, fatigue, fatigue on exertion, physical activity, HF functional class, drug therapy, dyspnea, and BMI. The patients' sleep patterns were evaluated using the *Pittsburg Sleep Quality Index*-PSQI. The PSQI was developed with the purpose to provide a valid, reliable, standardized measure that is easy to answer and interpret in order to evaluate sleep quality and define subjects as good or poor sleepers[14]. The questionnaire consists of 19 self-administered items and five questions to be answered by roommates.

The latter are used only for clinical information. The 19 questions are grouped into seven components with scores ranging from 0 to 3. The seven PSQI components are standardized versions of areas that that are routinely evaluated in clinical interviews of patients with sleep complaints, which are: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The scores on the seven components are then summed up to produce a global score, which ranges from 0 to 21; and the higher the score, the worse the sleep quality. A PSQI global score > 5 indicates that the individual has severe difficulties in at least two components, or moderate difficulties in more than three components. Good sleepers are categorized as those with scores equal to or less than 5, and poor sleepers if scores are greater than 5[14]. The PSQI used in this study was adapted to the Portuguese Language in a previous study[15] that obtained good reliability (Cronbach alpha of 0.82) and validity estimates (PSQI scores for patients with obstructive sleep apnea, depression and insomnia were significantly higher than control subjects)[15]. A 0.73 reliability was found for the PSQI in this sample, estimated by Cronbach alpha for the scores of the seven components.

The fatigue variable was evaluated using the *Dutch Fatigue Scale* (DUFS) and *Dutch Exertion Fatigue Scale* (DEFS) [16]. The DUFS measures fatigue, which is defined as *…an oppressive and overwhelming feeling of exhaustion and a reduced capacity to perform physical and mental activities in the habitual level…*[16], and consists of eight items. The scores in the items are summed to produce a global score that ranges between 8 and 40, in which, the higher the score, the higher the fatigue intensity. The DEFS measures exertion fatigue, defined as *…fatigue that is directly related to the activity…*[16], and it has nine items that are summed to produce a global score that ranges between 9 and 45, indicating the exertion fatigue intensity (the higher the score, the higher the intensity). The adaptation to the Portuguese Language and the validation of the scales showed good reliability in HF patients samples (DUFS = 0.84 and DEFS = 0.92)[16]. The reliability in this study, measured by Cronbach's alpha, was 0.90 for the DUFS scale and 0.92 for the DEFS scale.

The functional class variable is a categorization of the different HF stages related to the limitation of exertion. This classification has four categories that reflect the severity of the disease. The functional class was determined by the researcher and by the trained collector, following the *New York Heart Association* (NYHA) guideline. To evaluate dyspnea, patients were asked if they were short of breath. In affirmative cases, patients were then asked if the shortness of breath was present during small, medium, large or intense exertions, considering their performance in everyday activities, such as house chores, shopping, etc.

Drug therapy refers to the drugs introduced to solve a specific clinical condition, with different combinations and doses. In this study, this variable was restricted to the use of beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, and digitalis, which the patient informed using on the day of the interview, and was confirmed by the doctor's prescription that the patient was carrying.

Physical activity was evaluated using the IPAQ – *International Physical Activity Questionnaire*, proposed by the World Health Organization as a tool to determine the physical activity level of the global population. This study used the shorter version of the questionnaire, in which the answers produce a final classification according to four categories (very active, active, insufficiently active, sedentary). This classification is done by summing the frequency and duration of the different types of activities performed by the individual the week before.

Schooling and marital cohabitation were measures based on the patients' answer about the number of years in school and if there was any established marital cohabitation.

Body mass index is recognized as the international standard to evaluate obesity. It is obtained by dividing the individual's weight (Kg) by the squared height (meters). All the patients' weights and heights were taken after they completed the tool referring specifically to this variable.

Smoking was evaluated by the patients' answer to being a current or former cigarette smoker, the number of cigarettes smoked per day, and time as a smoker (current or former).

Data analysis

The data were stored and processed using SPSS® version 18. Because the PSQI scores did not present normal distribution (p=0.000), verified by the *Kolmogorov-Smirnov* test[17], Mann-Whitney tests were used for variables with two categories, and *Kruskal-Wallis* for variables with three or more categories to compare differences between distributions. After categorizing the PSQI scores, the Chi-Square test was used to verify the association between the sleeper category and the categorical variables, with Yates continuity correction for 2 x 2 tables. Tests showing statistical significance were submitted to residual analysis to interpret the contribution of each variable category[17]. In all tests, significance was established at 5%.

Binary logistic regression was performed with the variables that presented p values below 20% in the Chi-Square tests to estimate the odds ratio, using the 'poor sleepers' classification as the response variable.

RESULTS

Participants were 400 patients receiving ambulatory treatment for HF. Almost all patients (97.8%) had been medically diagnosed with cardiomyopathies. Table 1 lists all other sample characteristics.

Table 1 - Descriptive characteristics of the sample - São Paulo - 2009

Characteristics	N	%
Gender		
Male	259	64.8
Age (years)		
Mean (sd)	57.8 (11.6)	
Schooling (years)		
Mean (sd)	6.1 (3.9)	
Marital cohabitation		
Yes	279	69.8
Work Status		
Retires	203	50.7
Unemployed, Student, Homemaker	80	20.0
Employed (active)	78	19.5
On sickness leave	39	9.8
Functional Class		
I	59	14.7
II	202	50.5
III	128	32.0
IV	11	2.8

Note: (n = 400)

Sleep disturbances

The mean global score of the seven PSQI components was 8.70 (sd = 4.39) and median of 9.0 (Table 2). Of the 400 patients studied, 274 (68.50% with CI95%=[0.64; 0.73]) were categorized as *poor sleepers* and 126 (31.50%) as *good sleepers*. Of the total sample, 53.5% classified sleep as good or very good, and 46.5% as poor or very poor. The mean duration of sleep was six hours (sd=01h53min). A nocturnal sleep of less than 5 hours was reported by 21% of participants. The mean sleep latency time was 42 minutes (sd=36min). Of all participants, 37.2% reported it took them up to 15 minutes to fall asleep, whereas 22.8% took over one hour. The mean habitual sleep efficiency was 72% (sd=21.3%). Of all patients, 143 (35.8%) had habitual sleep efficiency greater than or equal to 85%, and 38.2% had efficiency lower than 65%. As to the use of sleep medication, 89.5% of patients reported not using any sleep medication, and 7% reported using at least three times a week. Many patients (47.0%) reported not having any difficulty staying awake on the first day, while 14.5% experienced serious difficulties.

Table 2 - Statistics: mean, standard deviation, confidence interval and median of scores in the PSQI components - São Paulo - 2009

PSQI Components	Mean (sd)	CI95%	Median
1. Subjective sleep quality	1.53(0.68)	[1.45; 1.60]	1.0
2. Sleep latency	1.68(1.26)	[1.56; 1.81]	2.0
3. Sleep duration	1.33(1.08)	[1.22; 1.43]	1.0
4. Habitual sleep efficiency	1.51(1.32)	[1.38; 1.64]	1.0
5. Sleep disturbances	1.33(0.60)	[1.27; 1.39]	1.0
6. Use of sleeping medication	0.28(0.83)	[0.19; 0.36]	0
7. Daytime dysfunction	1.05(1.13)	[0.94; 1.16]	1.0
Global PSQI score	**8.70(4.39)**	**[8.27; 9.14]**	**9.0**

Note: (n = 400)

The most frequent cause of sleep disturbances reported by patients was nocturia (72.2%), followed by respiratory discomfort (40.5%), pain (15.0%) and bad dreams (13.5%).

For the comparison and association tests, some variables were dichotomized: age became the age group of ≤ 60 years or more than 60 years; schooling became ≤ 8 years of education or more than 8 years of education; work situation became employed (active) or other categories (retired, unemployed, student, homemaker, on sickness leave); BMI became ≤25 kg/m^2 (yes) or >25 kg/m^2 (no). Functional class was presented as three categories: I, II, and categories III and IV were added together. Participants who reported having smoked over the last twelve months were considered smokers.

Women's PSQI scores (9.48; sd=4.44) were higher than those of men (8.28; sd=4.31; p=0.009) (Table 3), and the patients who were employed and active in their jobs had lower scores (7.35; sd=4.20) compared to the others (9.03; sd=4.40). The PSQI scores were significantly higher among patients with fatigue (p=0.000), exertion fatigue (p=0.000), dyspnea (p=0.000) and in higher functional classes (p=0.000). There was no association between PSQI scores and physical activity, drug treatment, BMI, and smoking.

Table 3 - Synthesis of the test results for the association between variables x PSQI - São Paulo - 2009

Variables	Sleep	
	PSQI (total score)	PSQI (poor sleepers)
Age	F>M p = 0.009	F=M p = 0.119
Age group	≤ 60 years = >60 years p = 0.337	≤ 60 years = >60 years p = 0.429
Schooling	≤ 8 years = ≥ 8 years p = 0.096	≤ 8years = > 8 years p = 0.972
Marital cohabitation	Yes = No p = 0.075	Yes = No p = 0.705
Work status (employed and active)	Employed <Other categories p = 0.013	Employed <Other categories p = 0.009
Fatigue	Yes > No p = 0.000	Yes > No p = 0.000
Fatigue on exertion	Yes > No p = 0.000	Yes > No p = 0.000
Physical activity	ins. active = active = sed p = 0.552	ins. active = active = sed p = 0.806
Functional class	CFI = CFII < CF III/IV p = 0.000	CFI < CFII < CF III/IV p = 0.000
Beta blocker	Yes = No p = 0.518	Yes = No p = 0.485
ACE	Yes = No p = 0.304	Yes = No p = 0.423
Dyspnea	Yes > No p = 0.000	Yes > No p = 0.000
Body Mass Index	Yes = No p = 0.526	Yes = No p = 0.669
Smoking	Yes = No p = 0.254	Yes = No p = 0.571

The proportions between good and poor sleepers in the socio-demographic variables were similar, except for work status, in which employed participants had a greater proportion of good sleepers than the other categories (p=0.009) (Table 3). The sleeper category was also significantly associated with some clinical variables. The proportion of poor sleepers was greater among patients with fatigue (p=0.000), exertion fatigue (p=0.000), dyspnea (p=0.000), and in higher functional classes (p=0.000) (Table 3). Table 3 summarizes the results of the univariate tests.

With the purpose to identify the variables associated with the sleeper category, the variables with p values lower than 20% in the Chi-Square test: gender (male/female), dyspnea (yes/no), exertion fatigue (DEFS <12.5 or DEFS≥12.5), fatigue (DUFS<14.5 or DUFS≥14.5), using digitalis (yes/no); functional class (I, II, and III/IV) and work status (employed/unemployed), were modeled using a binary logistic regression, with the *poor sleeper* category as the a dependent variable. The adjusted model was significant (p=0.000) and Table 4 presents the results for the only two statistically significant variables.

Table 4 - Logistic regression results for the PSQI *poor sleeper* category - São Paulo - 2009

Variable	β	Wald	p Value	OR	CI 95%	
					Lower	Upper
Dyspnea	1.17	13.27	0.000	3.23	1.72	6.07
Fatigue (DUFs≥14.5)	1.24	14.59	0.000	3.45	1.82	6.49

DISCUSSION

This study resulted in a mean global PSQI score of 8.70, indicating that sleep disturbances are a significant problem for HF patients, with a 68.5% prevalence in the sample.

Nocturia was the most frequent sleep disturbance, reported by 72.2% of the sample. Previous studies have shown that nocturia is correlated with a shorter sleep time in adults 40 years of age or more, and a worsened quality of sleep among the elderly[18]. A study with a similar sample evinced that nocturia was the most common cause of sleep disturbances, present in 83.2% of the participants[12]. However, further investigations are needed to study the relations between nocturia and sleep pattern in HF, especially considering the different functional classes and the use of diuretics.

As to PSQI scores, a study[12] with 125 HF patients found results that were, in general, similar to those of the present study.

The present study result shows that only 7.0% of patients reported using sleep medication at least three times a week, which differs from the results of another study with a similar sample, in which 14.4% of participants reported using sleep medication[12]. It is highlighted that both studies had similar PSQI scores. Therefore, the following explanations are suggested for the differences regarding the use of sleep medications: 1) sleep medications have a questionable efficacy for the quality of HF patients' sleep pattern, because despite being more medicated the patients of the comparison study[12] had scores similar to those of the present study; 2) the comparison study sample[12] has more severe sleep problems than the present study sample, which shows that their PSQI scores are similar only because they use more sleep medications; 3) in the setting where the comparison study[12] was performed, sleep has a greater value, causing a higher frequency of pharmacological interventions. Furthermore, in the comparison study it was observed that 9.6% had serious difficulties staying awake during the day, which was reported by 14.5% of the present study sample. Not using sleep medications may be associated with the high frequency of daytime sleepiness, which could eventually explain the differences between the results of the compared studies[12].

In this study, the global PSQI score was higher among women (p=0.009), but there was no gender difference regarding the sleeper category. These results disagree with previous studies[9,19], which have shown a higher prevalence of sleep changes among male patients. A study performed with 13 HF patients[9] found there were more sleep respiratory disturbances among men. Another study[19] also observed higher prevalence and intensity of sleep disturbances in male HF patients. These differences may be explained by the different sleep pattern evaluation methods, because in some studies the evaluations were performed using the PSQI[19], while polysomnography was used in the other one[9].

Work status was another socio-demographic variable associated with sleep in the present study sample. It was found that the highest proportion of good sleepers was among employed patients compared to those who were retired, unemployed or on sickness leave, and this is what contributed to the statistical difference that was found. When the association between functional class and work status was tested (in two categories: 1) employed and currently active 2) unemployed or currently not active at work) it was found that unemployed patients had the highest functional classes (p=0,000). In other words, a poorer sleep pattern among those who were unemployed or not active at the time of study could have resulted from the greater HF severity in this group. Furthermore, other studies on sleep and the work status of HF patients are necessary because a previous study[19] identified that 6.9% of sleep disturbance variance was explained by social function limitations, including work[12].

Of the 10 studied clinical variables, four were significantly associated with the sleep pattern (global PSQI score

and sleeper category): fatigue, exertion fatigue, dyspnea, and HF functional class (Table 3).

Fatigue and exertion fatigue variables were associated with the sleep pattern in terms of global scores (p=0.000), as well as in the sleeper category (p=0.000) (Table 3.) Fatigue is an important clinical symptom, common in HF. A study performed in the same location and with population similar to that of the present study found that sleep disturbance was statistically associated with the fatigue variables, and that fatigue and exertion fatigue intensities were higher among patients with sleep disturbances[5]. A study with 138 HF patients[16] found that sleep quality was significantly higher among patients with lower fatigue or exertion fatigue intensities. Just as fatigue, dyspnea is a common HF symptom[7]. HF patients often have limited functions due to dyspnea, and this symptom has a worse evolution as the disease progresses[4]. In addition, it is known that respiratory disturbances may affect sleep[1]. Therefore, it is pertinent to verify if there is any association between dyspnea and sleep pattern in HF patients. In the present study sample, a significant association was observed between dyspnea and higher PSQI scores (p=0.000), as between dyspnea and poor sleeper (p=0.000). The causes for insomnia in HF are attributed to dyspnea, orthopnea, and paroxysmal nocturnal dyspnea as they lead to the fragmentation of sleep[1]. Furthermore, the presence of paroxysmal nocturnal dyspnea is considered a risk factor for sleep disturbances[10].

No studies that associated dyspnea and sleep were found, only high incidence reports (79.8%-89%) of dyspnea among HF patients[20]. There are, however, frequent reports of respiratory sleep disturbances, especially among HF patients. Respiratory discomfort was the second most frequent cause of sleep problems (40.5%) according to the present study patients' reports. There is a need for more studies that characterize paroxysmal nocturnal dyspnea and analyze its associations with sleep patterns in HF. The PSQI, the tool used in the present study, by which we obtained the reports on sleep problems, does not give any details about the type of respiratory discomfort that the patients experienced.

The functional class indicates the degree of impairment of HF patients' functional condition, and sleep studies should take the patients' degree of HF aggravation into consideration, because it is known that sleep quality is worse in higher functional classes[10]. In this study, it was observed that patients with higher functional classes have poorer sleep quality in global scores (p=0.000) as well as in the sleeper category (p=0.000). Previous studies have found similar results[10,12].

In the present study sample, no association was found between sleep pattern and the variables: physical activity, drug treatment, body mass index, and smoking.

The results of the logistic regression for the sleeper category showed that the presence of dyspnea and fatigue were significant predictors of *poor sleepers* (Table 4).

Studies that used multiple analyses to investigate predictive variables of sleep differ from the present study variables. No other studies were found that used the same combination of variables of the present study, which makes it difficult to compare the results. We did, however, find two studies that aimed at verifying predictive variables of sleep in HF patients. One of them, performed with 125 HF patients, found that five predictors (schooling, social functioning, physical symptoms, functional class, and perceived health) were significant using hierarchical multiple regression, which explained 26.9% of sleep disorder variance[12]. The other study, performed with a sample of 84 HF patients, tested physiological variables that were potential predictors of sleep disturbances[3]. The authors found that functional class, age, gender, etiology, obesity, smoking, and the use of beta-blockers did not predict sleep disturbances[3]. It can be affirmed that the effects of HF severity are contradictory, because one of the studies observed that it added a 10% contribution to explaining the variance in PSQI scores[12]. On the other hand, there appears to be an agreement as to the contribution of physical symptoms to sleep problems in HF[12].

Studies with patients with other chronic diseases have found that variables such as BMI and physical health; sedentary lifestyle; depression or other psychosocial variables[21-22] are predictive of sleep problems.

In this study, the presence of fatigue and dyspnea increased, independently, the chances of being a poor sleeper. Nevertheless, further studies addressing variables predictive of sleep quality in HF patients including psychosocial and physical symptoms variables are needed to better understand the interaction and importance of factors correlated to sleep problems in this population.

IMPLICATIONS AND LIMITATIONS

The results that sleep pattern disturbances are common among HF patients should be used in practice. The sleep pattern of HF patients should be carefully evaluated and be performed early in the treatment. The fact that dyspnea and fatigue are related to sleep disturbances indicates the need to deepen sleep evaluations as symptoms first appear or increase. Another implication of this result is reviewing the NANDA-I (2009) sleep pattern disorder so as to include these variables as factors related to this diagnosis.

The early detection of sleep problems in HF patients and adopting control measures may benefit patients. Knowing the sleep disturbance symptoms of this population is a requisite in order to identify, develop and test appropriate interventions.

Few studies have addressed HF patients' sleep, but the inconsistent results, small samples, different variable measures, and the scarcity of studies with Brazilian samples confirm the need for more studies. The main limitations of the present study should be observed. Studies on the pre-

dictive variables of sleep suggest that psychosocial aspects, such as depression and anxiety, have a strong effect on the quality of sleep. The present study, however, was limited to having predominantly self-reported variables.

The fact the present study did not use a random sample, and that it was performed at a specialized public health care service to ambulatory patients poses limits to the generalization of results to other groups results. For instance, the fact that the sample consisted of ambulatory patients, higher HF severities were less frequent.

The sleep pattern in this study was evaluated using self-reports, and there was no validation by more objective measures such as polysomnography. Sleep pattern data obtained from self-reports and laboratory instrument may differ. However, the interest of the present study was to evaluate the subjective quality of sleep.

This is a cross-sectional study, and, therefore, it was not possible to evaluate the effects of the variables with time. Thus, longitudinal studies are needed in order to investigate possible risk factors for a poor sleep pattern.

CONCLUSION

There are many factors associated with sleep disturbances, suggesting that sleep is a complex variable related to several life spheres. The early detection of sleep problems in HF patients and adopting control measures can benefit patients.

It is important to emphasize the need for patients to be capable of evaluating their own sleep and the negative effect of unsatisfactory sleep pattern, so they can be encouraged to report these problems to health care professionals. Understanding the interrelation between the different symptoms of the disease will help patients to make contextual evaluations of their own progress. On the other hand, health care professionals must show positive attitudes towards sleep evaluation as an important health element, by developing skills to evaluate and diagnose sleep problems also considering the context. In other words, the multi-dimensional character and interaction between the many HF symptoms should be taken into consideration.

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