Correlation between sleep and quality of life in patients with heart failure

Correlação entre sono e qualidade de vida em pacientes com insuficiência cardíaca

Correlación entre sueño y calidad de vida en los pacientes con insuficiencia cardíaca

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ABSTRACT | Heart failure (HF) is a serious and growing public health problem on the world. Among its many features there are low quality of life (QOL) and excessive daytime sleepiness (EDS) due to sleep disorders which impairs its quality. It was identified the EDS and sleep quality in patients with HF and their SDE was correlated to their QOL. Among the 52 subjects of the study, 23 patients completed the study (13 M), with average age of 60.5 years, functional class (FC) II and III, ejection fraction ≤ 45%. Subjects were evaluated for their quality of sleep, EDS and QOL. Questionnaires were applied in the form of interview by using the SF-36 for QOL, Pittsburgh Sleep Quality Index Questionnaire for quality of sleep and Epworth Sleepiness Scale for SDE. A total of 60.86% of the sample showed poor sleep quality. Correlating QOL to EDS, significant results were obtained in the pain (p=0.04 and r=-43), vitality (p=0.05 and r=-0.40) and social functioning (p=0.003 and r=-0.59). The sample has a poor sleep quality, with presence of SDE negatively correlated with QOL in aspects of vitality, pain and social functioning.

Keywords | Heart Failure; Quality of Life; Sleep Disorders by Excessive Somnolence

RESUMO | A insuficiência cardíaca (IC) é um problema grave e crescente de saúde pública no cenário mundial. Dentre suas várias características, estão a baixa qualidade de vida (QV) e sonolência diurna excessiva (SDE) em virtude dos distúrbios do sono, que prejudicam sua qualidade. Identificou-se a SDE e a qualidade do sono (QS) em pacientes com IC e, correlacionou-se a SDE à QV desses pacientes. Dos 52 indivíduos incluídos no estudo, 23 pacientes o concluíram (13 H), com idade média de 60,5 anos, classe funcional (CF) II e III, com fração de ejeção ≤ 45%. Aplicou-se o 36-item Short-Form Health Survey (SF-36) para QV, Questionário de Pittsburgh para QS, e Escala de Sonolência de Epworth para SDE. Ao final, 60,86% da amostra apresentaram QS ruim. Ao correlacionar-se QV com o grau de SDE, obtiveram-se resultados significativos para dor (p=0,04 e r=-0,43), vitalidade - VT (p=0,05 e r=-0,40) e aspectos sociais -AS (p=0,003 e r=-0,59). A amostra estudada apresenta QS ruim, com SDE estando presente e se correlacionando de forma negativa com QV em seus aspectos de dor, VT e AS.

Descritores | Insuficiência Cardíaca; Qualidade de Vida; Distúrbios do Sono por Sonolência Excessiva.

RESUMEN | La insuficiencia cardíaca (IC) es un problema mundialmente grave y creciente en la salud pública. La mala calidad de vida (QV) y la somnolencia excesiva (SDE), debida a los trastornos del sueño, son las principales características que perjudican su calidad. Se identificó la SDE y la calidad del sueño (QS) en pacientes con IC y se los correlacionó con estos pacientes. De los 52 sujetos participantes, concluyeron el estudio 23 pacientes (13 H), con un promedio de edad de 60,5 años, la clase funcional (CF) II y III y fracción de eyección del ≤ 45%. Se aplicó 36-item Short-Form Health Survey (SF-36) a la QV, el cuestionario de Pittsburgh para la QS y la Escala de Somnolencia de Epworth para la SDE. Los resultados mostraron que en el 60,86% de la muestra no se obtuvo una buena QS y al correlacionarse la QV

con el grado SDE los resultados fueron significativos al dolor (p=0,04 y r=-0,43), a la vitalidad - VT (p=0,05 y r=-0,40) y a los aspectos sociales - AS (p=0,003 y r=-0,59). En la muestra estudiada se mostró una mala QS, además estaba presente la SDE correlacionándola negativamente con la QV en los aspectos dolor, VT y AS.

INTRODUCTION

Heart failure (HF) is a serious health care problem worldwide, with large impacts in morbidity and mortality and significant financial expenditure. It is characterized for having a bad prognosis[1]. In Brazil, 6.4 million individuals are estimated to have HF[2], with 450 thousand other new cases a year[3]. It is a complex syvndrome whose patients' functional abilities (FA) progressively decline, with consequent exercise intolerance[4].

The symptoms regarding exercise intolerance are frequent in HF[5] and they are related to changes in the respiratory function[6]. Not only do those alterations result in functional limitations and higher breathing effort due to hyperpnea that exists during the performance of exercises[7], but also in hindered quality of life (QoL)[8].

Besides the decline in QoL, recent studies have shown the high prevalence of sleep disorders in HF, which are taken as indicators for heart failure severity in certain European patients. Apneas and repeated awakening fragment sleep, worsening the fatigue and causing excessive daytime sleepiness (EDS)[10].

EDS is defined as trouble keeping a desired wakefulness level, with a feeling of sleepiness at improper times[11]. EDS in adults is not yet perfectly understood. In the general population, EDS is found 8%[10] and 20% of studied subjects[12], and it interferes in professional and family activities and in social relationships[13,14].

Subjects with impaired sleep were shown to be incapable of quickly responding to external stimuli and to have more trouble concentrating, due to limitations in sleep quality or quantity, which damages their ability to perform certain activities[14]. Thus, screening work on sleep alterations must be a constant practice among professionals dealing with HF[15]. EDS prevalence in adults with HF is still under investigation, and the factors EDS correlates with are still unknown[16].

Therefore, evaluating quality of sleep (QoS) and EDS is observed to be required, in order to better guide therapeutic procedures and identify patients at risk. Due to the absence of a cure to HF, there is increasing interest in measuring the factors which affect the QoL in those patients, in an attempt to obtain data which result in better clinical interventions.

We have hypothesized the presence of EDS and bad QoS in evaluated patients, and a possible correlation between EDS and QoL. This study aimed to identify QoS and EDS in patients with HF, and to correlate their EDS to their QoL.

METHODOLOGY

Subjects

Based on the study by Casida et al.[17], which showed the linear correlation coefficient between EDS and QoL is r=0.6, the established sample size was 20 subjects, considering an alpha level of 0.05 and a test power of 0.80. The calculation was conducted by Bio Estat 5.3 software.

52 patients with HF were recruited, who were being supervised by a multidisciplinary team in the cardiology ward of a high-complexity hospital in Natal (RN). However, only 23 finished the study (Figure 1). 29 patients could not make it to the end as they had trouble commuting to the evaluation site, had difficulty understanding the questionnaires, or could not arrange their family commitments in a way that enabled them to come to the ward where the research would take place.

Patients were considered to be eligible if they had been diagnosed with HF, were between 18 and 90 years old, fell into NYHA classes II and III (New York Heart Association - NYHA), either had pacemakers or not, had the consent from the cardiologists supervising them, were found to be stable in regards to procedures and medications, had no cognitive deficits or any other comorbidities which could interfere n the evaluations. Patients who could give up the study during the execution of tests and the ones who did not understand the orders were excluded from the test.

All patients signed consent forms before their evaluations. This research was conducted according to
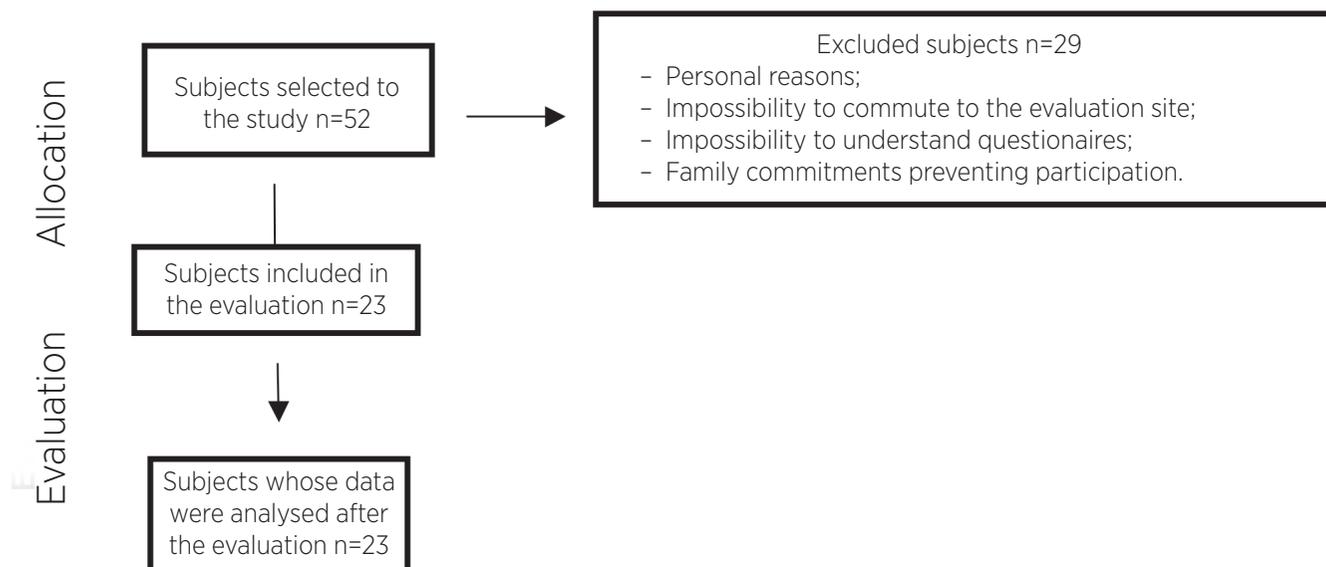
Figure 1. Flowchart of the study

Resolution 196/96 of Brazil's National Health Council (*Conselho Nacional de Saúde – CNS*), and it was approved by the Research Ethics Committee of the institution, under protocol no. 481/2011.

STUDY DYNAMICS

In this cross-sectional, exploratory and descriptive study, selected patients, after being medically consented to, were submitted to clinical evaluation, and were asked about their life habits (general health perceptions, practice of physical exercises, and use of medications). The ejection fraction values in the echocardiograms they brought on the evaluation day, which had been performed by their responsible cardiologists, were written down. An anthropometric assessment was conducted in order to characterize the sample. Subjects' body weights and heights were measured in a WELMY® scale, model R-100 (WELMY, Santa Bárbara d'Oeste, Brazil), and their body mass indices (BMI) were calculated.

Once they met the inclusion criteria, subjects were analyzed for QoS, EDS, and QoL. Questionnaires were applied as interviews by the same researcher, in order that illiterate patients be included.

Quality of sleep

Pittsburgh Sleep Quality Index (a version that had been translated and validated to Portuguese by Bertolazi

et al.,[18]) was applied in order to assess QoS. It contained ten open and semi-open questions, which make up seven components: 1) subjective sleep quality; 2) sleep latency; 3) sleep duration; 4) habitual sleep efficiency; 5) sleep disturbances; 6) use of sleeping medication; 7) daytime sleepiness and dysfunctions. Each parameter has specific scores, and the total score is 21 points. Scores over five indicated bad QoS[18].

Excessive daytime sleepiness

Epworth Sleepiness Scale (ESS) was used to evaluate EDS, in a version that had been translated and validated into the Portuguese language by Bertolazzi et al.[19]. It comprised key questions regarding eight everyday activities, which are used to analyze how sleep affects everyday life. Questions relate to everyday life habits. Even if patients have not performed any of the items recently, they are stimulated to try and find how they would affect them, and each situation is assigned the most proper scores, which are the following: 0=no chance of dozing; 1=slight chance of dozing; 2=moderate chance of dozing; 3=high chance of dozing. The global score ranges from 0 to 24, and scores above 10 suggest EDS diagnoses[19].

Quality of life

36-item Short-Form Health Survey (SF-36) quality of life questionnaire was used to evaluate Quality of life - in a version that had been translated and validated

into the Portuguese language by Ciconelli[20]. It comprises 36 items which are subdivided in 8 dimensions: physical role functioning (PRF); physical functioning (PP); bodily pain; general health perceptions (GHP); vitality (VT); social role functioning (SRF); emotional role functioning (ERF); and mental health (MH). Each dimension generates a score which can range from 0 to 100, zero corresponding to maximum disability and 100 to no disability[20].

STATISTICAL ANALYSIS

The data were analyzed with SPSS 17.0 software (SPSS Inc., Chicago, IL, USA). The descriptive analysis was presented as average and standard deviation (SD). Pearson product-moment correlation coefficient was used to check for the association between EDS and QoL, between age and QoS, and between age and QoL, once Kolmogorov-Smirnov test showed data were normally distributed. Correlation was classified as perfect (r=1), strong (1>r>0.75), moderate (0.75>r>0.5), weak (0.5>r>0), and inexistent (r=0). The significance level was 5%.

RESULTS

The clinical and anthropometric characteristics of the sample can be found in Table 1. A large part of the sample in this study was found to make use of diuretic drugs (100% - 23 subjects). 84.5% (20) of subjects made use of beta blockers; 38.5% (9) made use of antiaggregant drugs; 30.8% (7) made use of lipid-lowering drugs, and 15.4% (4) made use of antiarrhythmic agents. Around 69.6% (16) subjects used pacemakers. In regards to the practice of physical activity, 82.6% of patients (19) went walking for an average duration of 40, from 3 to 4 days in the week.

When evaluated for QoS, 60.9% (14) of the sample was found to have bad QoS, with Pittsburgh Sleep Quality Index scores >5, the average being 7 (±4.7). When evaluated for EDS, 39.1% (9) of the sample was found to have scores indicating EDS (scores>10), and 52% (12) of the sample was found to have ESS>8. The average ESS values in the studied sample was 8 (±5.1).

In regards to QoL, SF-36 showed averages of 60 (±25.6) for PRF; 5 (±38.5) for CA; 62 (±29.8) for bodily pain; 60 (±27.9) for GHP; 65 (±22.7) for VT;

62.5 (±20.6) for SRF; 50 (±39.2) for limitations due to ERF, and 72 (±23.7) for MH.

Table 1. General characteristics of the studied population

Age (years)	60,57±16,88
Gender Feminine Masculine	10 (43.5%)52.1% 13 (56.5%)47.9%
Weight (kg)	1.61±0.09
Height (m)	-
BMI (Kg/m²)	25.19±3.63
Functional class (NYHA) II III	15 (65.2%) 8 (34.8%)
HF Etiology Idiopathic Ischemic Valvular Hypertensive	14 (60.8%) 4 (17.4%) 3 (13%) 2 (8.8%)
LVEF (%)	29.18±7.38

BMI - Body Mass Index; NYHA - New York Heart Association; LVEF - left ventricular ejection fraction (echocardiogram). The values were shown as average and standard deviation (for gender, weight, height, BMI, and LVEF), with absolute and percentage values (for NYHA classes and HF etiology)

When QoL was correlated to EDS degrees through SF-36, significant results were obtained in domains regarding bodily pain (p=0.04 and r=-0.43), VT (p=0.05 and r=-0.40) , and SRF (p=0.003 and r=-0.59)(Table 2).

Table 2. Correlation (r) obtained each domain of SF-36 quality of life questionnaire and excessive daytime sleepiness (Epworth), in 23 diagnosed with heart failure

SF-36	r
PRF	-0.37
BODILY PAIN	-0.43*
GHP	0.41
VT	-0.40*
SRF	-0.59
ERF	-0.38
MH	-0.31

PRF – physical role functioning; PP – physical functioning; GHP –general health perceptions; VT - vitality; SRF –social role functioning; ERF – emotional role functioning; MH –mental health. *p≤0.05 for statistic significance

Correlation was tested between age and QoS, and it has not yielded a significant result (p=0.417 and r=0.178). Besides that, the correlation between age and

SF-36 questionnaire domains regarding QoL was also tested, but no significant correlations were obtained for all studied domains: Bodily pain: r=0,012 and p=0,957; LF: r=0.192 and p=0.380; PRF: r=0.178 and p=0.417; GHP: r=0.165 and p=0.452; VT: r=0.330 and p=0.124; SRF: r=0.379 and p=0.075; ERF: r=0.105 and p=0.634, and MH: r=0.200 and p=0361.

DISCUSSION

Recent studies have shown that screening work on sleep alterations must be a constant practice among professionals dealing with HF[9]. In this sample, 60.9% (14) of patients were found to have bad QoS. In the study by Santos et al.[21], who evaluated 400 subjects with HF (NYHA Classes I-IV), 68.5% (263) of the patients were also found to be "bad sleepers" (score ≥5 in the Pittsburgh Sleep Quality Index). In our sample, subjects were only classified as "bad sleepers" when they had scores above 5[18], which can justify the small classification difference as compared to the study by Santos[21]. The average slept hours were the same in both studies (6 hours).

Another study included 101 patients (average age= 74 years; NYHA class II=63.4% of patients), of whom 81.2% (82) were classified as "bad sleepers"[22]. This evaluated sample comprised patients with average age above the one in this study (60.5 years), which might explain the observed difference, as general population studies show that sleep disorders get more frequent as the age increases[23].

In this study, 52% (12) of the sample was found to have ESS>8. In the study by Ferrier et al.[24], 47% (25) of patients were found to have ESS>8, and their sample comprised 75% (40) of patients of NYHA classes I and II. The fact that our sample found a higher number of patients with ESS over 8 may be linked to the inclusion of NYHA class III patients, which possibly suggests that, the worse the NYHA class, the higher is EDS, as seen in Riegel et al.[16] when they correlated NYHA classification and EDS[16].

Riegel et al.[16], who investigated EDS prevalence and its correlation with fatigue in patients with HF, observed that 23.6% (66) of their sample were found to have EDS, and its main determining factors were QoS, NYHA classification, the non-ingestion of diuretic drugs, and the lack of physical activity; however, the last two factors were not significant. In that sample the correlation between EDS and fatigue was r=0.38 (p < 0.001).

The results found through SF-36 in this sample yielded higher scores in 6 domains (PRF, Bodily pain, GHP, VT, SRF, and MH), as compared to the ones from Bröstrom[25], who studied 223 patients with HF, of NYHA classes II-IV, whose average age was 76.5 years (higher than the average age in this sample). The QoL in the studied sample is found to be better than the one from Bröstrom[25] study, and it can be explained through the difference in ages between both studies (76.5 years versus 60.5 years), once QoL decreases as age increases[26]. However, in this study, the correlation between age and QoL domains was not found to be significant, which shows sample homogeneity despite the age variation.

EDS interferes in professional activities and social relationships, reduces cognitive performance, and increases the risk of accidents[13,14]. When QoL was correlated with EDS degrees through SF-36, significant results were found in regards to bodily pain, VT, and SRF domains, showing that the worse EDS is, the worse its aspects will be.

In the study by Casida et al.[17], QoL was evaluated through a specific questionnaire, the Minnesota Living with Heart Failure Questionnaire (MLHFQ). Variables regarding "day dysfunction due to sleepiness" (present in Pittsburgh Sleep Quality Index) were related to physical (r=0.71, p=0.02) and emotional domains (r=0.74, p=0.02) of QoL through the MLHFQ, as well as the global QoL measure (r=0.66, p=0.04). There were also significant correlations between global daytime sleepiness and physical (r=0.66, p=0.05), emotional (r=0.84, p=0.01) and global domains (r=0.82, p<0.01) of MLHFQ. Their findings were similar to ours, once we have found, when QoL was correlated to EDS degrees through SF-36, p=0.04 and r=-0.43 for bodily pain domain, p=0.05 and r=-0.40 for VT, and p=0.003 and r=-0.59 for SRF domain. Such domains are directly related to PP and ERF. A subject whose EDS interferes in their emotional role functioning will have their social role functioning influenced.

Patients with HF undergo pain which may result from a series of problems they face. For example, they may experience physical pain due to multiple comorbidities[27] and musculoskeletal pain because of lack of physical conditioning in HF. Loss of function and dependency, which takes place as the disease progresses, may result in spiritual/existential pains. Dyspnea, which is common in HF, may limit a patient's ability to interact socially, which contributes to his social isolation and pain[28].

Sleep physiology alterations, as seen in patients with HF, promote intense fatigue, diffuse pain, attention disorders, irritability, and marked diminishing of patients' discriminative ability and pain thresholds[29]. Non-invigorating sleep is accompanied by hindered performance of daytime activities, which is indicated by fatigue or low energy, attention, concentration, and memory deficits, irritability, hyperactivity and aggression, diminished professional and social relationship performances[30]. Pedrosa et al.[31] found that worse QoS is an independent predictor for low QoL.

The study by Gooneratne et al.[32] suggests that EDS must be continuously analyzed in elderly people, particularly in those with several medical conditions. That must be extended to patients with HF, as they are subjects who undergo associated comorbidities and altered vitality, and suffer from diffuse pains and from altered social functioning due to EDS. We believe that studies which produce and synthesize evidence on non-pharmacological interventions for sleep disorders, EDS, and QoS in patients with HF are required in order to guide therapeutic decisions and improve those patients' QoL.

This study is innovating in regards to the correlation between QoL and EDS. However, some limitations were faced, such as the number of patients who needed to be excluded, which interfered in the sample size. We suggest future studies with larger samples exploring QoL, EDS, and QoS. Besides that, no specific instrument was used to assess HF.

CONCLUSION

The data suggests that the studied sample has bad QoS and EDS, the latter, in turn, negative correlating with QoL in its aspects regarding vitality, bodily pain, and social role functioning.

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