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Research Article

The Relationship between Fatigue and Sleep Quality in Patients with Congestive Heart Failure (CHF)

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Abstract. Congestive Heart Failure (CHF) is a chronic cardiovascular condition characterized by the heart's inability to pump sufficient blood to meet the body's metabolic demands, leading to various physical and functional disturbances. Among the most frequently reported symptoms in patients with CHF are fatigue and impaired sleep quality, both of which may negatively affect daily functioning and quality of life. This study aimed to examine the relationship between fatigue and sleep quality in patients with Congestive Heart Failure. A quantitative study with a cross-sectional design was conducted at Sultan Agung Islamic Hospital, Semarang, from September to November 2025. A total of 163 patients with CHF were recruited using a sampling technique based on the Isaac and Michael formula. Data were collected using the Fatigue Severity Scale (FSS) to measure fatigue levels and the Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality, supported by medical record data. Statistical analysis was performed using the Chi-Square test. The results showed that most respondents were male (52.8%), aged 56–65 years (25.1%), and had been diagnosed with CHF for approximately two years (33.1%). More than half of the patients experienced high levels of fatigue (54.6%), while the majority reported poor sleep quality (71.2%). The Chi-Square test revealed a statistically significant relationship between fatigue and sleep quality in patients with CHF ($p = 0.001$; $p < 0.05$). This study concluded that low and high fatigue affect sleep quality in CHF patients. The study highlights the importance of comprehensive nursing care that includes early assessment and management of fatigue and sleep disturbances to improve patient well-being and support optimal clinical outcomes.

Keywords: Clinical Outcomes; Congestive Failure; Fatigue Severity; Nursing Care; Sleep Quality

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1. Background

Congestive Heart Failure (CHF) is a chronic cardiovascular disease characterized by the heart's inability to pump blood adequately to meet the tissue's oxygen and nutrient needs. This condition causes various clinical manifestations, both physical and psychological, such as shortness of breath, fatigue, peripheral edema, and sleep disturbances, which significantly impact patients' daily functioning and quality of life (Ardhiansyah & Hudiyawati, 2023) . CHF is a non-communicable disease with high morbidity and mortality rates and is a major challenge to global healthcare.

Cardiovascular disease is the leading cause of death worldwide, with an estimated 17.9 million deaths annually (WHO, 2022) . In Indonesia, the prevalence of CHF continues to increase. Basic Health Research data indicates a CHF prevalence of 1.6%, or an estimated 258,322 people, with Central Java among the top ten provinces with the highest number of CHF cases (Ministry of Health, 2021) . This increase in the number of CHF sufferers indicates that health problems resulting from heart failure will become increasingly complex in the future.

One of the most common symptoms reported by CHF patients is *fatigue* . *Fatigue* is a persistent state of physical and mental exhaustion that does not improve with rest and is associated with decreased cardiac output and tissue perfusion (Putra & Darliana, 2021) . *Fatigue* not only limits activity tolerance but also impacts psychological, social, and quality of life

aspects of patients (Utami et al., 2019) . Furthermore , *fatigue* is known to be closely associated with sleep disturbances in CHF patients.

Sleep quality disturbances are a common complaint experienced by approximately 75% of heart failure patients (Hanafi & Nurhayati, 2025) . Poor sleep quality in CHF patients can be caused by symptoms such as nocturnal dyspnea, chest pain, *paroxysmal nocturnal dyspnea* , and anxiety due to chronic illness (Oktavira & Hudiyawati, 2023) . Chronic sleep disturbances can worsen daytime fatigue, forming a negative cycle between fatigue and sleep quality that mutually exacerbate the patient's clinical condition (Khan et al., 2023) .

Several previous studies have shown a relationship between *fatigue* and sleep quality in patients with heart disease. Research by Tri Prasetyo (2024) found that most heart disease patients experience *fatigue* and poor sleep quality, with a significant relationship between the two variables. Another study by Putra and Darliana (2021) also showed that severe *fatigue* is associated with reduced quality of life in heart failure patients. However, research specifically examining the relationship between fatigue and sleep quality in patients with *congestive heart failure* , particularly at Sultan Agung Islamic Hospital in Semarang, is still limited.

Based on preliminary studies at Sultan Agung Islamic Hospital in Semarang, most CHF patients complain of persistent fatigue accompanied by sleep disturbances, such as difficulty falling asleep, frequent nighttime awakenings, and feeling unrefreshed upon waking. This condition impacts patients' energy, motivation, and ability to carry out daily activities. Therefore, research that comprehensively examines the relationship between *fatigue* and sleep quality in CHF patients is needed as a basis for developing more comprehensive nursing care.

The aim of this study was to determine the relationship between *fatigue* and sleep quality in patients with *Congestive Heart Failure* (CHF), so that the results of the study are expected to be a scientific basis for nurses in conducting nursing assessments and interventions that focus on managing fatigue and improving sleep quality in CHF patients.

2. Theoretical Study

Congestive Heart Failure (CHF) is a clinical syndrome that occurs due to the heart's inability to pump blood adequately to meet the metabolic needs of body tissues. This condition can be caused by impaired systolic and diastolic cardiac function, resulting in decreased cardiac output and the activation of maladaptive neurohormonal compensatory mechanisms (Hasanah, 2023) . Clinical manifestations of CHF include shortness of breath, peripheral edema, activity intolerance, and chronic fatigue, often accompanied by sleep disturbances due to pulmonary congestion and hemodynamic changes (Khan et al., 2023) .

Fatigue is one of the main symptoms frequently experienced by CHF patients and is subjective, persistent, and does not improve with rest. *Fatigue* occurs as a consequence of decreased tissue perfusion and oxygen supply due to reduced cardiac output (Azmiya, 2023) . This condition causes decreased activity tolerance, dependence in daily activities, and negatively impacts the patient's physical, psychological, and social aspects (Utami et al., 2019) . Putra and Darliana (2021) stated that *fatigue* in heart failure patients is associated with a decreased quality of life and can worsen the clinical condition if not managed adequately. In this study, *fatigue* was measured using *the Fatigue Severity Scale* (FSS), which assesses the severity of fatigue subjectively.

Besides *fatigue* , sleep quality disturbances are a common problem in CHF patients. Sleep quality reflects an individual's satisfaction with the duration, depth, efficiency, and continuity of sleep (Khan et al., 2023) . In CHF patients, sleep disturbances can be triggered by physical symptoms such as dyspnea, *paroxysmal nocturnal dyspnea* , chest pain, and side effects of medications such as diuretics that cause nocturia (Hanafi & Nurhayati, 2025) . Oktavira and Hudiyawati (nd) (Oktavira & Hudiyawati, 2023) stated that approximately 75% of heart failure patients experience poor sleep quality, which results in increased daytime fatigue and a decreased quality of life. In this study, sleep quality was measured using *the Pittsburgh Sleep Quality Index* (PSQI).

The relationship between *fatigue* and sleep quality in CHF patients is complex and interconnected. Poor sleep quality can exacerbate *fatigue* because the body does not receive optimal recovery time, while high levels *of fatigue* can lead to difficulty falling asleep, frequent nighttime awakenings, and feeling unrefreshed upon waking (Khan et al., 2023) . Research by Tri Prasetyo (2024) demonstrated a significant relationship between *fatigue* and sleep quality in heart disease patients, with increasing levels of *fatigue* accompanied by decreased sleep quality. Similar findings were also reported by Putra and Darliana (2021) , who demonstrated that

severe *fatigue* contributes to the decline in physical condition and well-being in heart failure patients.

Based on the theoretical description and previous research findings, it is understood that *fatigue* and sleep quality are two major interrelated issues in patients with *congestive heart failure* . This relationship requires further study as a basis for developing nursing interventions focused on fatigue management and improving sleep quality to support holistic and sustainable care for patients with CHF.

3. Research Methods

This study used a quantitative correlational design with a *cross-sectional approach* , meaning data were collected at a single point in time to determine the relationship between *fatigue* and sleep quality in patients with *congestive heart failure* (CHF). The study was conducted at Sultan Agung Islamic Hospital in Semarang from September to November 2025.

The population in this study were all patients *diagnosed with Congestive Heart Failure* (CHF) undergoing treatment at Sultan Agung Islamic Hospital in Semarang. Based on medical record data, the population of CHF patients in the period January–April 2025 was 282 patients. The sample size was determined using the Isaac and Michael formula with a 95% confidence level, resulting in a sample of 163 respondents. The sampling technique used purposive sampling, with inclusion criteria including CHF patients who had been diagnosed by a doctor, were conscious, and willing to be respondents, while exclusion criteria were patients who were unconscious or withdrew from the study (Sugiyono, 2020) .

Data collection was conducted using questionnaires and medical record data. *Fatigue variables* were measured using *the Fatigue Severity Scale* (FSS), which consists of 9 statement items with a Likert scale of 1–7 to assess the severity of fatigue subjectively (Azmiya, 2023) . Sleep quality variables were measured using *the Pittsburgh Sleep Quality Index* (PSQI), which consists of 19 question items and produces categories of good and poor sleep quality. The FSS and PSQI instruments have been declared valid and reliable based on previous research, with a Cronbach's Alpha value >0.7, making them suitable for use in this study (Nurmansyah et al., 2025) .

Data analysis was performed using univariate and bivariate analyses. Univariate analysis was used to describe respondent characteristics and the distribution of fatigue and sleep quality variables. Bivariate analysis was performed using the *Chi-Square test* to determine the relationship between fatigue and sleep quality in CHF patients with a significance level of $p < 0.05$.

The research model in this study describes *fatigue* as the independent variable and sleep quality as the dependent variable. The model suggests that increasing levels of *fatigue* can potentially contribute to decreased sleep quality in patients with *congestive heart failure* . The relationship between the variables was statistically analyzed to demonstrate a significant association between *fatigue* and sleep quality in the study population.

4. Results And Discussion

Respondent Characteristics

The characteristics of the respondents in this study were patients with congestive heart failure at Sultan Agung Islamic Hospital in Semarang, identified by age, gender, education level, and duration of heart failure. Based on the results of the study with 163 respondents, the frequency distribution of each variable is presented in the following table.

Age and Duration of Suffering

Table 1. *Congestive Heart Failure* patients at Sultan Agung Islamic Hospital Semarang in September-November 2025 (n=163).

Variables	Mean ± SD	Median	Min	Max	CI 95% (Lower-Upper)
Age	50.38 ± 13.026	50.00	22	74	48.37-52.40
Long Suffering	2.52 ± 1.244	2.00	1	5	2.33-2.71

The results of the study showed that the average age of respondents was 50.38 years with an age range of 22–74 years, and the majority of patients had suffered from *Congestive Heart Failure* (CHF) for approximately two years. These findings indicate that CHF occurs more frequently in the age group ≥50 years, who have a higher vulnerability due to physiological changes in the cardiovascular system such as increased arterial stiffness, decreased ventricular wall elasticity, and reduced β-adrenergic response, thereby reducing the heart's ability to adapt to workload. (Putri et al., 2023) . In the elderly, increased cardiovascular risk factors and

decreased physical and psychological function can worsen the clinical condition of CHF patients (Chorunnisa, 2021) . However, the presence of young patients in this study suggests that CHF is not solely related to the aging process but can also be caused by other factors such as congenital heart defects, cardiomyopathy, or heart valve abnormalities. In addition to age, the majority of respondents with a duration of approximately two years of suffering reflected the characteristics of CHF as a chronic and progressive disease, in which patients begin to experience physiological and psychological adaptation to their illness but are still at risk of clinical deterioration. This finding aligns with research by Latifardani and Hudiyawati (2023) which stated that a disease duration of 1–5 years is associated with increased symptoms, changes in physical condition, and a higher risk of hospitalization in CHF patients.

Gender and Education Level

Table 1. Frequency Distribution of Respondents Based on Gender and Education Level in *Congestive Heart Failure Patients* at Sultan Agung Islamic Hospital Semarang in September-November 2025.

Variables	**Frequency (n)**	**Percentage (%)**
Gender		
Man	86	52.8%
Woman	77	47.2%
Variables	**Frequency (n)**	**Percentage (%)**
Level of education		
Elementary School	29	17.8%
SMP	39	23.9%
SMA	54	33.1%
D3	18	11.0%
S1	23	14.1%

The results showed that the majority of respondents were male (52.8%) and had a high school education (33.1%), which describes the main sociodemographic characteristics of *Congestive Heart Failure* (CHF) patients at Sultan Agung Islamic Hospital, Semarang. The dominance of male patients is in line with the findings of Wei et al. (2023) and previous studies by Latifardani and Hudiyawati (2023) and Chorunnisa (2021) which showed that men have a higher proportion and risk of heart failure than women. This condition is related to higher exposure to cardiovascular risk factors in men, such as smoking habits, hypertension, dyslipidemia, unhealthy lifestyles, and genetic factors (Qiu et al., 2023) . In addition, men tend to experience heart failure at a younger age, while the risk in women increases after menopause due to the decreasing protective effect of the hormone estrogen on the cardiovascular system (Latifardani & Hudiyawati, 2023) . In terms of education, the majority of respondents had a secondary to lower education level, which could potentially impact patients' ability to understand health information and manage CHF (Chorunnisa, 2021) . Previous research has shown that low education is associated with unhealthy lifestyles, an increased risk of heart disease, and higher mortality rates (Khan et al., 2023) . In terms of education level, the majority of respondents had a high school education, followed by junior high and elementary school, indicating that most CHF patients were in the secondary to lower education group.

This condition has the potential to impact patients' ability to understand health information and manage their disease independently. Lower levels of education are known to be associated with limited health literacy and medication adherence (Latifardani & Hudiyawati, 2023) . Conversely, higher levels of education are associated with better health literacy and active involvement in care (Chorunnisa, 2021) . Consistent with previous research, educational attainment also plays a role in quality of life, fatigue, and sleep disturbances in heart failure patients (Barbareschi et al., 2021) . These findings suggest that, in addition to gender, educational attainment is an important characteristic that needs to be considered when providing education and nursing interventions to CHF patients.

***Fatigue* Levels in *Congestive Heart Failure* Patients**

The results of the univariate analysis showed that the majority of respondents experienced high levels *of fatigue* (54.6%), while the remainder were in the low *fatigue category* . The distribution of respondents' *fatigue levels* is presented in the following table.

Table 3. *Fatigue* Level in *Congestive Heart Failure* Patients at Sultan Agung Islamic Hospital in September-November 2025.

Variables	**Frequency (n)**	**Percentage (%)**
Fatigue Level		
High *Fatigue*	89	54.6%
Mild *Fatigue*	74	45.4%
Total	**163**	**100%**

Research results show that the majority of *Congestive Heart Failure* (CHF) patients experience high levels *of fatigue* (54.6%), confirming that fatigue is one of the dominant symptoms in heart failure patients. *Fatigue* in CHF patients is not only related to physical conditions but is also influenced by psychological and emotional changes due to the chronic disease (Novitasari, 2025) . *Fatigue* is a subjective complaint often experienced by patients with chronic diseases and is characterized by feelings of weakness, limited energy, decreased fitness, and disturbances during rest, which ultimately impact productivity and quality of life (Putra & Darliana, 2021) . The impact of *fatigue* in CHF patients is closely related to decreased *Health Related Quality of Life* (HRQoL) and the ability to carry out daily activities (ADLs), thus worsening the patient's functional condition (Noor, 2018). Pathophysiologically, fatigue in CHF patients is a complex syndrome involving various factors, such as impaired cardiovascular function, comorbidities, nutritional status, and the effects of therapy. Heart failure is characterized by fluid accumulation and vascular congestion, which increase the heart's workload and reduce oxygen perfusion to tissues, contributing to fatigue (Novitasari et al., 2025; Yang et al., 2025). Furthermore, emotional instability in CHF patients can exacerbate fatigue and reduce physical activity capacity (Noor, 2018) .

Advanced age and the presence of comorbidities such as diabetes mellitus and hypertension contribute to increased *fatigue levels* through decreased organ system function and the body's adaptive mechanisms (Khan et al., 2023) . An imbalance between the therapy administered and the patient's physiological response can also exacerbate fatigue, necessitating appropriate monitoring and treatment adjustments (Abilowo & Lubis, 2021) . Therefore, *fatigue* in CHF patients needs to be understood as a multidimensional problem that requires comprehensive management, not only through medical therapy but also through patient education and ongoing symptom management.

Sleep Quality in Congestive Heart Failure Patients

The analysis results showed that the majority of respondents had poor sleep quality (71.2%), while a small proportion had good sleep quality. The distribution of sleep quality in CHF patients is presented in the following table.

Table 4. *Congestive Heart Failure* Patients at Sultan Agung Islamic Hospital in September-November 2025

Variables	Frequency (n)	Percentage (%)
Quality Sleep		
Good	47	28.8%
Bad	116	71.2%
Total	**163**	**100%**

The results of the study showed that the majority of *Congestive Heart Failure* (CHF) patients had poor sleep quality (71.2%), which confirms that sleep disorders are a dominant problem in heart failure patients. Decreased sleep quality in CHF patients is influenced by various factors, including pain, anxiety, depression, environment, excess fluid, medication effects, nocturia, and paroxysmal nocturnal dyspnea, which significantly affect the quality of life and the patient's ability to carry out daily activities (Suwartika & Cahyati, 2019) . Chronic sleep cycle disorders cause ineffective sleep so that the body does not obtain optimal recovery, which has an impact on decreased daily activities, physical weakness, decreased immune system, instability of vital signs, impaired heart function, increased *fatigue* , and the risk of rehospitalization (Nurmansyah et al., 2025) . Physiologically, sleep disturbances such as nocturia and orthopnea worsen sleep quality and contribute to increased fatigue through autonomic nervous system dysregulation and decreased cardiovascular function, leading to low energy and prolonged daytime fatigue (Pavlovic et al., 2022) . These findings align with research by Jyotsna et al. (2023) which reported that approximately 75% of heart failure patients experience sleep disturbances, characterized by difficulty maintaining sleep, waking up too early, and excessive sleepiness. Poor sleep quality in CHF patients is known to have a broad impact on physical health, cognitive function, mental health, and daily activities, and contributes to worsening cardiovascular conditions, increased *fatigue* , and high levels of depressive symptoms (Suwartika & Cahyati, 2019) . Thus, poor sleep quality in CHF patients is a complex and far-reaching clinical problem, requiring integrated nursing attention and intervention as part of comprehensive care for patients with *Congestive Heart Failure* .

The Relationship Between Fatigue and Sleep Quality in Congestive Heart Failure Patients

Bivariate analysis using the Chi-Square test showed a significant association between *fatigue* and sleep quality in CHF patients with a p value of 0.001 ($p < 0.05$). The results of this analysis are presented in the following table.

Table 2. Relationship between *Fatigue* and Sleep Quality in *Congestive Heart Failure Patients* (n=163) September-November 2025.

Fatigue	Quality Sleep		Total	OR	p
	Good	Bad			
Tall	42 (25.8%)	47 (28.8%)	89 (54.6%)	12,332	0.001
Light	5 (3.1%)	69 (42.3%)	74 (45.4%)		

The results of this study indicate a significant relationship between *fatigue* and sleep quality in patients with *Congestive Heart Failure* (CHF), as evidenced by a Chi-square test with a p value of 0.000 ($p < 0.05$), indicating that fatigue, whether mild or severe, contributes to decreased sleep quality in patients. *Fatigue* in CHF patients is a condition of physical and mental exhaustion that arises due to a decrease in the heart's ability to meet the oxygen and nutrient needs of the tissues. This causes prolonged physical discomfort, reduces the body's ability to relax, and disrupts the physiological mechanisms that play a role in the sleep process. This condition can trigger sleep disorders such as difficulty initiating sleep, frequent nighttime awakenings, and non-restorative sleep. In addition, *fatigue* in CHF patients is often accompanied by other symptoms such as *dyspnea* , chest pain, and anxiety, which can increase sympathetic nervous system activity and inhibit the deep sleep phase, thereby worsening sleep quality. These findings are in line with previous research that states that chronic fatigue is closely related to impaired sleep quality in heart failure patients and can form a negative cycle. Where sleep disturbances worsen daytime fatigue, while increased fatigue further disrupts sleep (Awaludin et al., 2023) .

However, several studies have shown inconsistent results, such as those reported by Riegel et al. (2022) , who stated that *fatigue* in heart failure patients is multifactorial and not always directly related to sleep quality because it is also influenced by comorbidities, psychological conditions, and impaired tissue perfusion. These differences in results indicate that the relationship between *fatigue* and sleep quality can vary depending on population characteristics, measurement methods, and the patient's clinical condition. Nevertheless, the results of this study confirm that *fatigue* is an important factor that needs to be considered in the nursing care of CHF patients, because appropriate fatigue management has the potential to improve sleep quality and the patient's overall quality of life.

5. Conclusion And Suggestions

This study concluded that there is a significant relationship between *fatigue* and sleep quality in patients with Congestive Heart Failure (CHF) at Sultan Agung Islamic Hospital in Semarang, where the level of fatigue, both mild and severe, contributes to decreased sleep quality. These findings confirm that *fatigue* and sleep disorders are interrelated clinical problems that impact the functional condition and quality of life of CHF patients. Based on these results, it is recommended that nurses conduct routine nursing assessments and interventions for *fatigue* and sleep quality as part of comprehensive nursing care, including ongoing education and symptom management. This study has limitations because it used a cross-sectional design that cannot explain a direct cause-and-effect relationship, and was conducted in a single hospital, so generalization of the results requires caution. Future studies are recommended to use a longitudinal or interventional design, involve a wider population, and explore other factors that contribute to *fatigue* and sleep quality in CHF patients.

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