



## Sleep Disturbances in Heart Failure Patients

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### Short Communication

Heart failure refers to a condition whereby the heart fails to pump sufficiently to maintain a blood flow which will meet the body's need, and is the common final pathway for various cardiac diseases. Despite advances in heart failure treatment, the prognosis remains poor with high rates of hospitalisation, morbidity and mortality. Recent data has reported that all-cause mortality is up to 32.1% at 2 years and 54% at 5 years for heart failure patients [1]. These data highlight the importance of identifying all modifiable conditions that may aggravate heart failure in these patients.

Symptomatology has been identified as prognostic in nature among heart failure patients, where the symptom burden has been reported as an independent predictor for cardiac rehospitalisation and cardiac mortality [2]. Within the symptom profile, sleep disturbance has received the least attention despite its high prevalence among the heart failure population. Indeed, self-reported sleep disturbances, such as difficulty in falling asleep, waking up during the night and early morning awakening, affect up to 65%-81% of the heart failure patients, [3] particularly older patients. Sleep disturbance has been reported as the most burdensome symptom by heart failure patients [3]. The patients with sleep disturbance are associated with poorer self-care [4] and their quality of life is heavily jeopardised [5]. A recent study found that the subjective sleep disturbance in heart failure patients resulted in a two-fold increased risk for all-cause as well as cardiovascular hospitalisations after adjusting for potential confounders [6]. Similarly, self-reported insomnia (defined as using hypnotics, or the presence of moderate to severe sleep disturbance symptoms accompanied by the impairment of daytime functioning) was found to be an independent predictor of cardiac events (i.e. cardiac death and/or worsening heart failure) among heart failure patients [7]. All these negative consequences highlight the need for a better understanding of the factors affecting sleep quality in patients with heart failure.

The factors associated with sleep disturbance have been explored extensively among other populations. Surprisingly, previous studies have seldom focused on heart failure patients despite the high prevalence of sleep disturbance in this vulnerable group. Spielman's 3P Model is regarded as a comprehensive framework for assessing the factors contributing to insomnia/sleep disturbance [8]. Spielman proposed three types of factors which are associated with sleep disturbance. Predisposing factors are the biological and psychological characteristics that increase one's predisposition to insomnia/sleep disturbance (e.g. age, gender). Precipitating factors refer to medical, environmental, situational or psychological factors that trigger insomnia/sleep disturbance (e.g. illness, medication), while perpetuating factors are elements that maintain or exacerbate sleep disturbance, which are typically beliefs and thoughts (e.g. fear of insomnia, excessive worries about daytime consequences) or behaviours (e.g. extending the time spent in bed to try to sleep more, naps) that people use to cope with sleep disturbance. Such beliefs and behaviours perpetuate insomnia/sleep disturbance.

Riegel et al. examined the modifiable factors associated with sleep disturbance in heart failure patients and identified several precipitating and perpetuating factors, which included the number of drugs known to cause daytime somnolence, depression, worse overall perceived health, and better sleep hygiene [9]. Likewise, other studies included more factors specified in Spielman's 3P Model appeared to better explain sleep disturbance in heart failure patients. Broström and colleagues found that the sleep of heart failure patients was affected by their daily activities, the disease itself and cardiac symptoms, such as nocturnal dyspnoea and cough [10]. With Spielman's 3P Model as the conceptual framework, Andrews et al. adopted a mixed methods approach to evaluate the factors associated with insomnia in 11 heart failure patients [11]. The patients identified heart failure as the primary precipitating factor and various comorbid and psychological conditions, which perpetuated their sleep disturbance, including dysrhythmias, discomfort from implanted devices, adverse drug reactions, pain, nocturia, depression, anxiety and fear. Moreover, the participants in this study often strongly endorsed certain dysfunctional beliefs about sleep, such as unrealistic expectations about their sleep requirements and become excessively worried when such requirements were not met

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[11]. Andrews et al. adopted a systematic approach to examine the factors associated with sleep disturbance in heart failure patients. However, as this study utilised data saturation as the criterion to determine the required sample size, only 11 patients were included. Such a small sample severely jeopardised the quantitative data. In the Chinese heart failure population, Wang et al. found that females, poor self-perceived health, more comorbidities and a greater depressive mood led to a higher risk of poor sleep [3]. Sleep disordered breathing is very common among heart failure patients, which affect over 50% of the patient population [12]. Among the two major types of sleep disordered breathing: obstructive and central sleep apnoea, whereby central sleep apnoea predominates in heart failure population. Irrespective to the type of sleep apnoea, the associated cyclical apnoea and hypopnoea episodes disturb patients' sleep cycle. The impact of sleep disordered breathing on the sleep quality of heart failure patients has received little attention in previous studies with mixed findings being reported [9,12]. Such influence on the sleep of heart failure patients warrants more research attention.

Although the aforementioned studies support the postulations of Spielman's 3P Model in explaining sleep disturbance in heart failure patients, none of the previous studies included all the model factors to adequately address the complexity of sleep disturbance in these patients. Growing evidence has shown the role of psychosocial factors in perpetuating insomnia/sleep disturbance in other populations. For instance, dysfunctional sleep-related cognitions have been identified as an important predictor of insomnia severity, use of hypnotics and treatment outcomes. A person with higher neuroticism, a personality trait that responds with negative emotions to threat, frustration, or loss, is positively associated with anxiety and sleep disturbance [13]. The impact of these psychosocial factors in contributing to sleep disturbance among heart failure patients has not been adequately investigated. Similarly, levels of physical activity have been found to be associated with late-life insomnia in the older population [14], and experimental studies have suggested that physical activity is effective in alleviating sleep disordered breathing [15]. The interactions between these bio-physiological factors and their influence on the sleep quality of heart failure patients have never been studied. In view of their nature of being amenable to intervention, there is an imperative need to investigate the influence of sleep disruptive cognitions, neuroticism, and physical activity and sleep disordered breathing on sleep disturbance among heart failure patients. In addition, previous studies focused on investigating the subjective sleep quality using self-reporting by patients but none of them has utilised an objective measure to assess the sleep pattern in patients with heart failure. This study aims to add to the body of evidence in understanding the mechanism whereby various predisposing, precipitating and perpetuating factors interact to predict sleep disturbance in heart failure patients.

Normal sleep promotes a state of cardiovascular relaxation. The metabolic rate, sympathetic nervous system activity and heart rate is reduced during sleep, whereas vagal tone is increased. These

physiological changes are beneficial for the heart failure condition. It is important to seek a comprehensive understanding of the factors associated with sleep disturbance among heart failure patients, so as to provide the most relevant evidence to inform the strategies to bring about a prompt improvement in sleep in heart failure patients.

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