

**Progressive Muscle Relaxation: A Sleep Intervention for Individuals with Chronic  
Obstructive Pulmonary Disease**

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**Progressive Muscle Relaxation: A Sleep Intervention for Individuals with Chronic  
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Literature Review**

This literature review was conducted to provide knowledge on the topic of chronic obstructive pulmonary disease (COPD) and sleep, and to establish the need for a research study that would compare and examine the effectiveness of sleep interventions. COPD, a chronic and progressive disease, refers to the presence of chronic bronchitis and emphysema and is anticipated to become the third leading cause of death worldwide by 2030 (Chegeni et al., 2018; Pendleton & Schultz-Krohn, 2018). As COPD progresses, individuals experience difficulty breathing or dyspnea, along with nocturnal cough and insomnia which cause sleep disturbances that can lead to fatigue, decreased participation in daily life, impaired cognition, increased exacerbations, anxiety, and poor overall quality of life (Chegeni et al., 2018; Omachi, 2012; Paap et al., 2014).

It is within the scope of occupational therapy to address the issues of fatigue and sleep experienced by patients with COPD across a variety of treatment settings. Through the implementation of sleep interventions, occupational therapists have the potential to improve patients with COPD's sleep quality and quality of life which will impact their participation in valued daily activities. Although sleep issues are highly prevalent in COPD, there is limited evidence supporting the therapeutic effects of sleep interventions delivered by occupational therapists (OTs) (Gutman et al., 2016; Ho & Siu, 2018). Furthermore, little is known on the efficacy of relaxation techniques, specifically progressive muscle relaxation (PMR), as a sleep intervention with the COPD population (Chegeni et al., 2018; Singh et al., 2009). These gaps in

the literature may impact occupational therapy service delivery to COPD patients in terms of safety, effectiveness, and cost (Sun et al., 2013).

This literature review included peer-reviewed studies published between 2009-2020 and consisted of mostly Level I and Level III studies. While a majority of the studies were conducted in hospitals by nurses, pulmonologists, medical doctors, and occupational therapists, a minority were conducted in the outpatient and home setting. The research studies examined in this review were conducted in the following countries: United States, Turkey, China, the Netherlands, India, Norway, and Iran. Included in the studies, participants ranged from healthy adults with sleep disturbances to older adults with COPD. This chapter will be organized into three topic areas that reflect the most current literature on COPD and sleep interventions: fatigue and COPD, effectiveness of common sleep interventions for individuals with COPD, and PMR for individuals with COPD.

### **Fatigue and COPD**

Individuals with COPD experience sleep disturbances leading to fatigue. This fatigue impacts participation in valued occupations and quality of life.

#### ***Common Sleep Disturbances Leading to Fatigue***

Sleep disturbances are commonly reported by patients with COPD and lead to fatigue. Research indicates sleep disturbances in patients with COPD are often a result of medication side-effects, positioning, pain, anxiety, dyspnea, wheezing, and coughing (CD et al., 2016; Cinar & Olgun, 2010; Chegeni et al., 2018; Doede, et al., 2014). Further contributing to fatigue, patients with COPD may experience difficulty falling and staying asleep, insomnia, nightmares, nocturnal hypoxemia, and increased nocturnal hypercapnia (CD et al., 2016; Cinar & Olgun, 2010). While the type of sleeping disturbance experienced by the individual may vary, nearly all

individuals with COPD experience difficulty sleeping and fatigue at some point throughout the disease progression. Occupational therapists aim to promote sleep by teaching patients with COPD strategies for preparing and participating in sleep. By using a preventative approach to intervention, occupational therapists can educate patients with COPD on sleep interventions to prevent and decrease the frequency of sleep disturbances. Understanding the specific sleep disturbances patients with COPD experience will help occupational therapists address these disturbances through appropriate sleep interventions.

### ***Fatigue's Impact on Occupations***

Due to a lack of sleep and poor sleep quality, individuals with COPD commonly suffer from fatigue (Cinar & O'lgun, 2010; Paap et al., 2014; Yilmaz & Kapucu, 2017). Symptoms of COPD often lead to fatigue which impacts an individual's participation in physical, social, and emotional activities they desire and need to complete in their daily lives (Cinar & Olgun, 2010; Martinsen et al., 2016). For instance, individuals are met with performance problems completing their activities of daily living, instrumental activities of daily living, work, leisure, and socialization (Pendleton & Schultz-Krohn, 2018; Yilmaz & Kapucu, 2017). By addressing fatigue and sleep problems with COPD patients, occupational therapists gain an understanding of how sleep impacts performance in daily occupations and are then able to provide tools to remedy these issues resulting in increased participation in their valued occupations. Research shows treating and educating patients with COPD in their natural home environment is most beneficial (Martisen et al. 2016; Yilmaz & Kapucu, 2017). Furthermore, the research indicates individuals with COPD require multiple occupational therapy sessions to see positive results (Martisen et al., 2016). Concurrent with these findings, it is assumed occupational therapy interventions addressing fatigue and sleep in individuals with COPD will produce the best results when

delivered in the home setting over multiple sessions.

### ***Fatigue's Impact on Quality of Life***

Over the past decade, literature indicates patients with COPD report lower health related quality of life. As COPD progresses, the individual's quality of life worsens (Zohal et al., 2014). Poor sleep quality, leading to fatigue, substantially influences individuals with COPD overall quality of life (Cinar & Olgun, 2010; Paap et al., 2014; Scharf et al., 2011; Zohal et al., 2014).

Paap et al. (2014) conducted a study to determine which areas of quality of life are most important to COPD patients by interviewing healthcare professionals. The healthcare professionals indicated fatigue is most often reported by patients when discussing COPD's negative impacts on function (Paap et al., 2014). Furthermore, limitations in physical and social health were reported to contribute to a decline in quality of life (Paap et al., 2014). Paap et al. (2014) indicate physical decline impacts the ability to perform daily activities which often results in "feelings of anger, depression, and loss of autonomy" which limit quality of life (p. 1358). As individuals are less able to perform daily activities, socialization is impacted as many must decrease social outings and terminate employment which reduces their social network, further limiting their quality of life (Paap et al., 2014). These findings suggest improvements in sleep quality, which reduce fatigue, will increase the quality of life in individuals with COPD as they will be able to increase their participation in meaningful daily activities and socialization.

Scharf et al. (2011) reported health-related quality of life is associated with sleep quality. The researchers studied one-hundred-eighty patients with COPD and determined many of the patients with COPD experienced poor sleep quality (Scharf et al., 2011). This was determined by administering the Pittsburgh Sleep Quality Index which indicated "general and disease-specific health-related quality of life was low" and decreased sleep quality predicted decreased quality of

life (Scharf et al., 2011, p. 6). These findings indicate if sleep quality increases, quality of life will also increase in individuals with COPD.

### **Effectiveness of Common Sleep Interventions for Individuals with COPD**

In recent years, research on sleep disturbances has sought to find effective non-pharmacological interventions to improve sleep quality. Currently, multiple studies have suggested sleep hygiene interventions are the most used non-pharmacological sleep intervention. Recently, the literature has focused on various non-pharmacological relaxation techniques to examine their effectiveness on increasing sleep quality, and therefore quality of life and activity participation. Relaxation techniques use a “variety of methods and manipulations used to reduce stress, muscle tension, and anxiety in the body. The techniques are thought to work by triggering the Relaxation Response, a state of deep relaxation that induces a decrease in heart rate, respiration rate, blood pressure, and breathing rate” (SPINE-health, n.d., para. 1). The following sleep interventions and relaxation techniques have been studied: Sleep hygiene, meditation, guided imagery, the Dreampad Pillow®, music, and progressive muscle relaxation (PMR). In the literature, these relaxation techniques are often compared to the commonly practiced sleep hygiene interventions.

#### ***Sleep Hygiene***

Sleep hygiene interventions have been outlined by the National Sleep Foundation and include: maintaining a sleep schedule, avoiding afternoon naps, exercising daily, creating a comfortable sleep environment, avoiding bright light and electronics before bedtime, avoiding alcohol, cigarettes, coffee, and heavy meals in the evening, and keeping a sleep journal (Sleep Foundation, 2020). Many researchers utilize these guidelines in their studies when comparing sleep hygiene with various relaxation techniques (CD et al., 2016; Cinar et al., 2010; Black et al,

2015; Gutman et al. 2016; Sun et al., 2013). These sleep tactics have been utilized in a universal behavioral program known as SHE (sleep hygiene education) “which targets the modification of day-to-day behavioral and environmental factors that contribute to poor sleep” (Black et al, 2015, p. 495). Most research has shown while sleep hygiene interventions are effective, they are not as effective when compared with relaxation interventions (Black et al, 2015; Gutman et al. 2016). As preliminary research is indicating relaxation interventions cause greater positive results, it is important to expand on such research to strengthen findings.

### ***Meditation***

Meditation has been utilized as a relaxation technique as it has been shown to decrease the response of the sympathetic nervous system which controls the flight-or-fight response (Curiati et al. 2005). Furthermore, research has shown meditation is beneficial for individuals with sleep disturbances and it allows for sleep to unfold (Sun et al., 2013). Most often, studies utilize audio recordings, such as iRest®, to guide individuals through meditation (Gutman et al., 2016; Black et al., 2015; Sun et al., 2013). Research indicates meditation improves sleep quality (Black et al., 2015; Sun et al., 2013). Gutman et al. (2016) found after 2 weeks of meditation, participants experienced a significantly “greater total sleep time” (p.7). Initial research indicates meditation utilized as an intervention over a short period of time with carry-over at home produces positive sleep results.

### ***Guided Imagery***

Two studies utilized guided imagery as a relaxation technique (Bertisch et al., 2012; Halpin et al., 2016). Halpin et al. (2016) asked participants with COPD to visualize themselves in a place where they feel happy and relaxed and to focus on the experience of existing in this place. In this study, guided imagery was compared to a variety of other relaxation techniques but

was rated the “most effective” and “most likely to be performed by the majority” of participants (Halpin et al., 2016, p. 2317). On the contrary, Bertisch et al. (2012) found guided imagery was used less frequently than other relaxation techniques such as PMR and deep breathing. Due to conflicting data, additional research is needed to examine the true effectiveness of guided imagery as a sleep intervention.

### ***Other Interventions***

Two interventions mentioned briefly in the literature, but have limited research, include the Dreampad Pillow® and music. Both interventions helped to decrease sleep disturbances and symptoms of COPD which lead to impaired sleep.

Gutman et al. researched the effectiveness of the Dreampad Pillow® in their 2016 study. The Dreampad Pillow® produces audio vibrations that are sent to the user’s inner ear through electromechanical transducers in the pillow (Gutman et al., 2016). The audio can only be heard by the user and is thought to “increase parasympathetic nervous system activity that helps to slow physiological and cognitive processes” (Gutman et al., 2016, p. 2). Participants who utilized the Dreampad Pillow® for two weeks “experienced fewer nighttime awakenings” compared to participants who participated in meditation and participants who received sleep hygiene interventions (Gutman et al., 2016, p. 7).

According to Singh et al. (2009), music can be used as a relaxation technique and has been shown to reduce anxiety and dyspnea. Furthermore, music has been utilized as a distraction to increase exercise endurance for individuals with COPD (Singh et al., 2009). In Singh et al.’s 2009 study, participants listened to instrumental music at 60-80 beats per minute for 30 minutes, two times a day, which has been shown to cause relaxation. This study showed that in merely two sessions, music has a soothing effect and shows “clinically significant changes in anxiety

and dyspnea along with physiologic measures” in hospitalized patients with COPD exacerbations (Singh et al., 2009, p. 213).

### ***Progressive Muscle Relaxation***

In the literature, the most commonly seen relaxation technique is PMR. PMR consists of systematically and voluntarily relaxing the major muscle groups of the body from the hands to the feet with the goal of physical and psychological relaxation (Chegeni et al., 2018; Sun et al., 2013; Yilmaz & Kapucu, 2017). Halpin et al. (2016) found that individuals with COPD ranked PMR high in effectiveness compared to other common relaxation techniques. Recent research has found that PMR is effective in decreasing dyspnea, fatigue, anxiety, and sleep problems (Chegeni et al., 2018; Yilmaz & Kapucu, 2017). Furthermore, PMR has been shown to be effective in improving sleep quality and cognitive functions and increasing respiratory function and oxygen saturation (Chegeni et al., 2018; Sun et al., 2013; Yilmaz & Kapucu, 2017). Sun et al. (2013) indicates that PMR may assist healthcare professionals in providing “safe, simple and cost-effective health care...while treating sleep disturbances” (p. 1277). Despite limited research on non-pharmacological sleep interventions, there is strong evidence that PMR is a highly effective relaxation technique for increasing sleep quality and decreasing fatigue. Future research should also focus on the use of PMR with individuals with chronic conditions, such as COPD.

### **PMR for Individuals with COPD**

Preliminary research indicates PMR is an effective relaxation technique for increasing sleep quality and overall quality of life in individuals with COPD. Multiple studies utilized Jacobson’s PMR accompanied with Bernstein and Borkovec standardized and validated procedures (Chegeni et al., 2018; Singh et al., 2009; Yilmaz & Kapucu, 2017). The majority of research studies conducted the intervention over an 8-week period, although one brief study

lasted merely 1 day (Chegeni et al., 2018; Singh et al., 2009; Yilmaz & Kapucu, 2017). PMR was taught in a variety of intervention settings including inpatient hospitals, respiratory clinics, and at home (Chegeni et al., 2018; Halpin et al., 2016; Singh et al., 2009; Yilmaz & Kapucu, 2017).

PMR instruction in the natural home setting produces the strongest results for individuals with COPD. For example, Yilmaz & Kapucu (2017) found after implementing PMR interventions 2 days a week for 8 weeks, participants had decreases in fatigue and dyspnea, and experienced fewer sleep problems. The authors attribute these findings to PMR “increasing respiratory function, increasing oxygen saturation, improving sleep quality, decreasing dyspnea severity, anxiety, and depression, decreasing stress levels, and decreasing physical and mental stress by ensuring the relaxation of skeletal muscles with its sympathetic nervous system inhibiting effect” (Yilmaz & Kapucu, 2017, p. 374-5). Limited studies have provided PMR education in the home setting for patients with COPD, indicating a need for further exploration.

Despite the treatment setting, each study included some PMR implementation at home. All studies provided participants with an instructional audio recording to utilize when participating in PMR at home (Chegeni et al., 2018; Singh et al., 2009; Yilmaz & Kapucu, 2017). In Chegeni et al.’s 2018 study, participants were instructed to listen to the PMR recording while wearing headphones in the morning and evening “in a quiet place when they were least tired, and in a comfortable position wearing loose clothing” (p. 67). Furthermore, Halpin et al. (2016) found that participants were likely to utilize PMR and see positive effects. Research indicates implementation at home is key for continued and retained improvements in sleep quality and quality of life for individuals with COPD.

Although there is currently a limited number of high-level studies, overall, PMR has

shown to be a beneficial relaxation technique for addressing sleep difficulties associated with COPD. PMR successfully reduces anxiety, dyspnea, stress, and physiological measures and improves fatigue, global sleep quality, and respiratory functions (Chegeni et al., 2018; Singh et al., 2009; Yilmaz & Kapucu, 2017). Furthermore, Paap et al. (2014) found fatigue levels to be highly related to quality of life for individuals with COPD. Therefore, as PMR decreases fatigue, quality of life increases for these individuals.

### **Conclusion**

Individuals with COPD often experience fatigue which results from sleep disturbances impacting their ability to participate in daily occupations affecting their overall quality of life. Research on non-pharmacological sleep interventions has begun to focus on relaxation techniques in comparison to general sleep hygiene interventions. These relaxation techniques included: the Dreampad Pillow®, meditation, music, guided imagery, and PMR. Of these interventions, PMR appears to be the most effective in improving sleep quality and quality of life in individuals with COPD, although there is currently a limited amount of evidence.

The literature is clear that symptoms of COPD impact sleep and result in fatigue that limits engagement and a decreased quality of life. While the literature indicates that relaxation techniques improve sleep quality and reduce fatigue, gaps still exist as most studies exclude individuals with COPD as participants and do not utilize occupational therapists as the health care practitioners delivering the intervention. Furthermore, there is a limited amount of research focusing on sleep intervention in the home setting. In light of this, the proposed study would aim to determine the effectiveness of PMR compared to a generic sleep hygiene intervention implemented by occupational therapists with adults with COPD. The interventions will be delivered in the home setting by the occupational therapist. This study will contribute to the

developing literature on COPD and relaxation techniques as sleep interventions and aims to support occupational therapy's unique role in addressing sleep. By comparing the effectiveness of PMR with sleep hygiene practices with individuals with COPD, research can determine which intervention is most effective in increasing sleep quality and quality of life.

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