

REVIEW ARTICLE

EFFECT OF PROGRESSIVE MUSCLE RELAXATION ON SLEEP QUALITY AMONG PATIENTS WITH CHRONIC DISEASES: A LITERATURE REVIEW

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Abstract

Background: Sleep disturbance is prevalent among patients with chronic diseases. Thus, the use of non-pharmacological interventions is needed. Progressive muscle relaxation is considered effective to improve sleep quality, but its discussion is still limited.

Objective: To investigate the effect of progressive muscle relaxation on sleep quality among chronic disease patients.

Design: Literature review.

Data Sources: Search was performed through the CINAHL, Science Direct, and ProQuest database from 2014 to 2019 for English-based, full-text research articles.

Review Methods: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methods was used to select articles. Critical Appraisal Skills Programme was used for quality assessment.

Results: From the 644 articles yielded, six articles were included. Progressive muscle relaxation could be given alone or in combination with cognitive behavioural therapy. It also has been proven to improve sleep quality among patients with chronic diseases regardless their ages. Procedures in progressive muscle relaxation vary, but all studies reported significant improvements on sleep quality. Most of studies used audio as a medium for progressive muscle relaxation training.

Conclusion: Progressive muscle relaxation significantly improves the sleep quality among patients with chronic diseases. It is recommended for future studies to compare the effectivity between 4 or 7 muscle groups and 16 muscle groups on sleep quality.

KEYWORDS

progressive muscle relaxation; chronic disease; sleep; outcome assessment; health care

BACKGROUND

The prevalence of sleep disturbance among patients with chronic diseases remains high, which ranged from 2.8% to 17% according to a study in nine countries ([Koyanagi et al., 2014](#)). Sleep disturbance or poor sleep quality is higher in patients with chronic conditions than those with non-chronic conditions. Patients with chronic conditions with more than four diseases have a risk of sleep disturbance increased to 7.62-fold (5.88-9.87) than those with non-chronic disease. This condition is likely associated with disruption of breathing during sleep, night time awakening caused by a specific symptom of disease (nocturia in diabetes), pain, and anxiety ([Koyanagi et al., 2014](#)).

There are many bad impacts of sleep disturbance for patients with chronic diseases. In patients with haemodialysis, sleep impairment would decrease the quality of life and increase medication use and mortality rate ([Elder et al., 2008](#)). A recent study reported that poor sleep quality is associated with lower vitamin D levels ([Han et al., 2017](#)). Disturbed sleep also causes increased mortality rates, exacerbations and use of emergency department for chronic obstructive

pulmonary disease ([Omachi et al., 2012](#)). In diabetes, sleep impairment is associated with higher levels of HbA1c ([Ohkuma et al., 2013](#)) and increases fatigue ([Zhu et al., 2018](#)).

To treat sleep disturbance, medications have been used. However, the long-term use of sleep medication or pharmacological intervention may have side effects, and its effectiveness and safety in improving sleep quality among older people still need to be proven ([Burke et al., 2018](#)). Therefore, a non-pharmacological intervention should be provided as an alternative method of improving sleep quality among patients with chronic diseases. There are many types of non-pharmacological interventions such as physical activity, light therapy, mind-body intervention (progressive muscle relaxation, yoga), acupressure, back massage, and chamomile extract beverage for improving sleep quality ([Shang et al., 2019](#)). According to a qualitative study, progressive muscle relaxation has become the second most favourite method in improving sleep quality ([Hyland et al., 2016](#)). A previous review has also explained the effectivity of progressive muscle relaxation in the

improvement of sleep quality in menopause women ([Amanda, 2019](#)). In addition, other reviews have discussed the use of mind body interventions (meditation, mind-body movement and relaxation) on sleep quality ([Neuendorf et al., 2015](#)), and the use of the progressive muscle relaxation among cancer patients ([Pelekasis et al., 2017](#)). A review that proves the benefit of progressive muscle relaxation for patients of other chronic diseases is needed. Our review would summarize the findings of recent studies in regard to the effectivity of progressive muscle relaxation on sleep quality among patients with chronic diseases.

METHODS

Design and Search Methods

Searching procedure was conducted through CINAHL, ScienceDirect, and ProQuest databases from 2014 to 2019 for English-based full-text research articles using specific keywords including “*progressive muscle relaxation*”, and “*sleep*”. We used Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methods for article selection ([Pati & Lorusso, 2018](#)).

Inclusion and Exclusion Criteria

The inclusion criteria were based on PICO (Population = patients with chronic diseases, Intervention = progressive muscle relaxation, Comparison = between progressive muscle relaxation and other complementary techniques, and Outcome = sleep quality). The exclusion criteria were observational studies, study protocols and review articles.

Screening

The first author did the first screening, and the other authors did the screening for content analysis.

Data Extraction

Data were extracted in the table which contains authors, participants, design, intervention, and outcome.

Quality Appraisal

We used the Critical Appraisal Skills Programme to assess the quality of research articles ([Critical Appraisal Skills & Programme, 2018](#)).

Data Analysis

A thematic analysis was used to analyse the data, with the following steps: 1) understanding data, 2) identifying codes, 3) identifying themes from the codes, 4) refinement of the themes, and 5) defining themes ([Braun & Clarke, 2006](#)).

RESULTS

Search Outcome

We yielded 520 articles from Science Direct, 25 from CINAHL, and 102 from ProQuest. Title and abstract screening were firstly done, 60 articles were excluded. There were 24 articles for full-text review, 18 of which were excluded. Finally, six articles were included (See **Figure 1**). Of the six articles, five studies investigated the progressive muscle relaxation alone to improve sleep quality, and one study gave

progressive muscle relaxation as a part of cognitive behavioural therapy (CBT). The summary of the studies or data extraction is in **Table 1**.

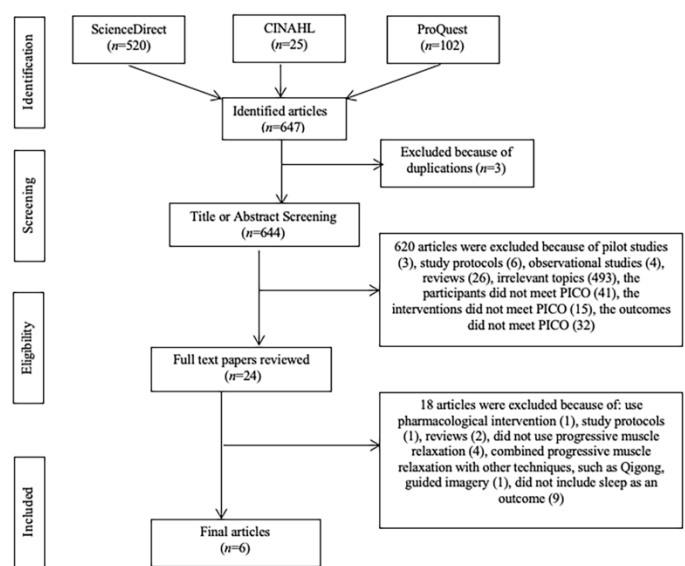


Figure 1 Flow chart of article selection

Quality Assessment Results

Of six articles, two articles have strong validity results, two articles have moderate validity because no blinding was performed, and the others have low validity because of the absence of randomisation and blinding. There are no studies excluded based on the quality assessment (See **Table 2**).

Analytical Findings

Total participants in this review are 648 patients. Not all of the participants were elderly. The mean age of the participants is 55.41 years. Most of them aged more than 40 years, and majority are Asians (90.89%). The studies were conducted in Turkey (60.95%), China (15.89%), Iran (14.04%), and Spain (8.9%). Five studies were conducted in community and the other was in a hospital setting. The average of the study period is 7.6 weeks ranged from 4 to 12 weeks. But, the studies in hospital settings have shortest duration, 7 days.

Progressive muscle relaxation procedures

There were similarity and differentiation of progressive muscle relaxation procedures among all studies. The similarity lied in the duration of progressive muscle relaxation. All studies did progressive muscle relaxation for 30 minutes, but varied in terms of frequency per day and muscle groups. Progressive muscle relaxation could be done twice a day or once. For once a day, the intervention was done in the evening before sleep ([Akgün Şahin & Dayapoğlu, 2015](#); [Alparslan et al., 2016](#)). For twice a day, it was done in the morning and before sleep ([Chegeni et al., 2018](#); [Hou et al., 2014](#); [Yilmaz & Kapucu, 2017](#)).

Various muscle groups involved in the intervention were identified. It could be 16, 7, or 4 muscle groups. Two articles applied progressive muscle relaxation using 16 muscle groups ([Alparslan et al., 2016](#); [Chegeni et al., 2018](#)), one article using 7 muscle groups ([Yilmaz & Kapucu, 2017](#)), one article using 4 muscle groups ([Akgün Şahin & Dayapoğlu, 2015](#)), and one article combined the 16, 7, and 4 muscle groups ([Mateu et al., 2018](#)).

Table 1 Summary of Included Studies

Authors	Design	Participant	N	Media	Intervention	Duration	Control group	Tool	Outcome
(Alparslan et al., 2016)	Interventional Investigation	Internal ward patient (n=235)	282	Booklet	Progressive muscle relaxation	7 days	Standard care (n=47)	PSQI	Significant sleep quality in experiment group ($p=.001$), but no differences between two group at the end of research ($p=.891$)
(Hou et al., 2014)	RCT	Maintenance haemodialysis (n=52)	103		CBT	12 weeks	Standard care (n=51)	PSQI	Significant improvement of sleep quality ($p=.001$)
(Mateu et al., 2018)	RCT crossover	Non-oncology Low back pain (n=28)	58	CD Audio	Jacobson progressive muscle relaxation	8 weeks	Music (n=30)	MOSS	Significant improvement in sleep adequacy and sleep time and decrease in sleep disturbance ($p<.05$)
(Akgün Şahin & Dayapoğlu, 2015)	Pre-experiment	COPD (n=45)	45	Handbook & CD audio	Progressive muscle relaxation, deep breathing	6 weeks	-	PSQI	Significant improvement of sleep quality ($p<.01$)
(Chegeni et al., 2018)	RCT	COPD (n=45)	91	Booklet, CD audio	Progressive muscle relaxation	8 weeks	Routine care (n=46)	PSQI	Significant improvement in PSQI sub-categories: sleep quality, sleep latency, sleep duration and sleep efficiency ($p<.05$)
(Yilmaz & Kapucu, 2017)	RCT	COPD (n=34)	68	Booklet, CD audio	Progressive muscle relaxation	4 weeks	No intervention (n=34)	CASIS	Significant improvement of sleep quality ($p<.01$)

Note: RCT: Randomized Controlled Trial, CD: Compact Disk, CBT: Cognitive Behavioural Therapy, COPD: Chronic Obstructive Pulmonary Disease, PSQI: Pittsburgh Sleep Quality Index, MOSS: Medical Outcome Study-Sleep, CASIS: COPD and Asthma Sleep Impact Scale

Progressive muscle relaxation media

Various media were identified in the progressive muscle relaxation. Most of the articles used CD audio as their medium (Akgün Şahin & Dayapoğlu, 2015; Chegeni et al., 2018; Mateu et al., 2018; Yilmaz & Kapucu, 2017). Two of them used CD from the Turkish Psychologist Association, one study used CD from the Student Research Committee

of Khoramabad School of Nursing and Midwifery, and the others did not clearly explain what media they used. Mp3 player was used to deliver the audio. Booklets and handbooks were still used in four studies (Akgün Şahin & Dayapoğlu, 2015; Alparslan et al., 2016; Chegeni et al., 2018; Yilmaz & Kapucu, 2017).

Table 2 CASP analysis

Authors	Clear focused issue	Randomised allocation	Properly analysed	Blinding	Similar start	Treated equally	Treatment effect	Confidence limits	Applicability
(Alparslan et al., 2016)	√		√			√	√	√	√
(Hou et al., 2014)	√	√	√		√	√	√	√	√
(Mateu et al., 2018)	√	√	√	√	√	√	√	√	√
(Akgün Şahin & Dayapoğlu, 2015)	√		√		√	√	√	√	√
(Chegeni et al., 2018)	√	√	√	√	√	√	√	√	√
(Yilmaz & Kapucu, 2017)	√	√	√		√	√	√	√	√

DISCUSSION

Progressive muscle relaxation was first developed by Jacobson in 1934 as tension and relaxation of 16 muscle groups. Bernstein et al. (2000) modified progressive muscle relaxation for 7 and 4 muscle groups via counting and recall. There are three techniques of progressive muscle relaxation including Jacobson's progressive muscle relaxation, overt progressive and covert progressive muscle relaxation. The Jacobson's progressive muscle relaxation uses less tension of muscle then relaxation. Overt progressive muscle relaxation uses strong tension of

muscle then releases it. Meanwhile, covert progressive muscle relaxation lets the tension of muscle away (Smith, 2005).

Progressive muscle relaxation procedures

Despite the variation of the procedures, there was improvement of sleep quality in most studies at the end of the studies ($p<.05$). One study reported no difference between control and experiment group, which was likely due to the age of the participants. In that study, most participants in the control group aged less than 50 years and those in the experiment group aged more than 50 years (Alparslan et al., 2016). Sleep impairment is probably more prevalent among older adults. The

underlying reasons are cognitive problems, pain, and chronic disease (Lewis et al., 2014). In this review, not all of the participants were elderly. Progressive muscle relaxation is effective for all chronic disease patients regardless their age.

A multi-country study found that some chronic diseases had significant association with sleep problems. There were asthma, chronic obstructive pulmonary disease (COPD), diabetes, and stroke (Koyanagi et al., 2014). In our review, of all six articles, three articles discussed the effectivity of progressive muscle relaxation in COPD patients, one article in haemodialysis patients, one in low back pain patients, and the remaining articles in internal ward patients. Most of the participants suffered from COPD. There are several factors causing sleep disturbance among COPD patients, including cough, dyspnea, pleghm, wheeze, and use of corticosteroid inhaler (Chang et al., 2016; Omachi et al., 2012). In haemodialysis patients, sleep disturbance is associated with duration of the disease and pain (Pan et al., 2019). Pain intensity has dependent association with sleep disturbance although the correlation is weak (Alsaadi et al., 2011).

The effectivity of progressive muscle relaxation in improving sleep quality is explained in several mechanisms. Progressive muscle relaxation could give a relaxation effect through distraction of attention and sensation of systemic tension and relaxation of the muscle (Bernstein et al., 2000). It also induces deep relaxation by reducing the electrical activity in the inferior frontal gyrus (IFG), superior frontal gyrus (SFG) and posterior cingulate cortex (PCC) (Kobayashi & Koitabashi, 2016). This relaxation would decrease anxiety and depression as well as relieving insomnia symptom (Wolkove et al., 2007).

Progressive muscle relaxation media

Progressive muscle relaxation is one of the effective and safe methods for improving sleep quality among patients with chronic diseases either in a community setting or in an hospital setting. The positive effect of progressive muscle relaxation in sleep can be seen in 7 days. There is no adverse effect reported by all studies. Nurses could give progressive muscle relaxation for helping patients to manage their sleep impairment. Training of progressive muscle relaxation could be given as a part of discharge planning to enhance self-management at home, which could improve quality of life (Zeng et al., 2014).

Progressive muscle relaxation is very applicable in clinical settings. CD audio is most likely used as a medium. However, the use of CD audio in Indonesia would give more challenge because of technology barrier. Many of the hospitalized patients do not have device to use CD audio. Some studies used mp3 player for the patients. The cost needed to buy an mp3 player for each patient would increase the hospital burden. We need more advanced technology to solve this problem such as smartphone apps. This technology is more applicable due to the growing number of mobile owners in Indonesia. Recently, Indonesia becomes the fourth largest marketplace for mobile phone worldwide (Statista Research Department, 2020).

Limitations of the study

This review has several limitations including the narrow range of the study years and the use of English-based articles, which might exclude other important articles that use other languages.

CONCLUSION

Progressive muscle relaxation could improve sleep quality among patients with chronic diseases. There were variations in progressive muscle relaxation techniques, including variations in frequency in each day, muscle groups involved, and media. Despite the variance in progressive muscle relaxation methods, all studies reported significant results of progressive muscle relaxation in enhancing sleep quality among chronic disease patients.

DECLARATION OF CONFLICTING INTEREST

There is no conflict of interest to disclosure.

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AUTHORS CONTRIBUTION

SM: Done literature review, and drafted the manuscript.

SY: Contributed to design, methodology, discussion, and final proof of the manuscript.

DD: Analysed the manuscript.

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