How Registered Nurses can work to support the middle aged and aged adults suffering from sleep disorders

A descriptive review

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Abstract

Background: Sleep disorders are serious enough to interfere with normal physical, mental, social and emotional functioning. Sleep disorders are common among the middle aged and aged adults, the problem of sleep disorders in the aged becomes more and more obvious with increasing age. Sleep problem could increase mortality, the mortality rate for lower sleep efficiency is almost half of the total mortality rate.

Aim: The aim of the review is to describe how registered nurses can work to support middle aged and aged adults with sleep disorders.

Method: 30 Scientific articles with a quantitative design were identified in the database of Medline through PubMed. Chosen articles were processed in order to determine whether they are relevant to the study aim. In the end, 13 articles with quantitative approaches were used by the authors.

Results: The authors describe the measures of sleep disorders’ assessment used in the included articles. The results are based on 13 articles with quantitative approaches. These articles introduced several nursing interventions (music and music video, light therapy, acupressure, aromatherapy, lower-limb warming, warm foot, behavior therapy and exercise) for middle aged and aged adults with sleep disorders. The warm foot bath had little effect on the sleep disorders yet.

Conclusions: Sleep disorder is one of the most common symptoms of the middle aged and aged adults. Long-term repeated sleep disorders may affect the treatment and rehabilitation of the primary disease of the middle aged and aged adults, aggravate or induce some physical diseases, and is an important factor threatening the physical and mental health of the middle aged and aged adults. The authors introduced eight ways of nursing interventions for the middle aged and aged adults with sleep disorders. All of these interventions had effective on improving sleep disorders except for foot baths.

Keywords: Aged, middle aged, nursing, sleep disorders.
摘要

背景：睡眠障碍的严重程度足以干扰正常的生理、心理、社交和情感功能。睡眠障碍在中年和老年人群中普遍存在，随着年龄的增长，老年人的睡眠障碍问题也越来越明显。睡眠问题会增加死亡率，睡眠效率低下的死亡率几乎是总死亡率的一半。

目的：这篇综述的目的是描述注册护士如何工作以支持中年和老年人的睡眠障碍。

方法：通过 PubMed，30 篇具有定量设计的科学文章在 Medline 数据库中被检索到。对选定的文章进行筛选，以确定它们是否与研究目的有关。最后，作者使用了 13 篇具有定量设计文章。

结果：作者描述了在包括的文章中使用的睡眠障碍评估的措施。研究结果以 13 篇文章为基础，采用定量的方法。这些文章介绍了几种（音乐和音乐录像、光疗、穴位按压、芳香疗法、足浴、热敷下肢、行为疗法和运动）关于中老年人和老年人睡眠障碍的护理干预措施。然而足浴对睡眠障碍没有显著影响。

总结：睡眠障碍是中老年人最常见的症状之一。长期睡眠障碍可能影响原发性疾病和康复中老年人，加重或诱发某些身体疾病，是危及中老年人身心健康的重要因素。作者介绍了 8 种中老年睡眠障碍的护理干预方法。除足浴外，所有这些干预措施对提高睡眠质量均有效。

关键词：中年人，老年人，护理，睡眠障碍。
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Table 3 overview of selected articles aims and main results
1. Introduction

1.1 Background

Sleep is essential for human health and physical function (Tabloski, 2014). However, many people are suffering from sleep problem, especially in the middle aged and aged adults. Research data of Praharaj, Gupta and Gaur (2018) showed that 40-70% of the middle aged and aged adults have sleep problems (Praharaj et al. 2018). One study found that the annual incidence was about 5 percent (Roepke & Ancoli-Israel, 2010). The changes in sleep patterns were expected as people age, and age also would lead to disturbed sleep. Similarly, as you age, your ability to sleep decreases with age and the total number of individuals with sleep disorders would increase as the population ages (Roepke & Ancoli-Israel, 2010). In addition, sleep disorders in the middle aged and aged adults have affected their lives, because of that, more attention should be paid to them with the sleep problem (Praharaj et al. 2018).

1.2 Sleep disorders in middle aged and aged adults

1.2.1 Definitions

Sleep disorder is a medical disorder of the sleep patterns of a person. It is often referred to the abnormal amount of sleep, abnormal behaviors in sleep and manifestations of the normal rhythmic alternation disorder of sleep and awakening (Rodriguez, Dzierzewski & Alessi, 2015, Roepke & Ancoli-Israel, 2010). According to the United Nations World Health Organization, new rules for the classification of age 45-59 were middle-aged. In developing countries, aged adults were over 60 years old (WHO, 1994).

1.2.2 Reasons and personal characteristics of sleep disorders

Many reasons for sleep disorders in aged adults have been reported, including primary sleep disorders, medical and mental illness, adverse effects of drugs, psychosocial factors, behavior and environmental factors (Roepke & Ancoli-Israel, 2010). Personal characteristics included age (generally believed to be over 60), woman and a history of depression (Tabloski, 2014).

1.3 Roy’s adaptation model

According to Sister Callita Roy, people are an organized whole with biological, psychological and social attributes. As an open system, people are always in a state of
continuous interaction with the environment. In order to maintain integrity, human beings should adapt with the environment (Phillips & Harris, 2014). Roy believes that humans are the primary caregivers, humans are also cared for and can be individuals, families, groups, communities, or societies. Environment is all the circumstances, events and factors and stimulation that affect the development and behavior of individuals or groups (Phillips & Harris, 2014). Sleep disorders are also caused by the uncoordinated relationship between people and environment, especially the aged adults. They cannot adapt the environment because of mental and physical aging (Praharaj et al. 2018). Roy defines nursing as an applied discipline, which promotes the overall adaptability of individuals or groups by promoting the interaction between people and the environment. The goal of nursing is to promote adaptive responses, reducing or eliminating ineffective responses (Phillips & Harris, 2014). In the nursing process, nurse will follow the model with 6 ways: 1) Assesses the behaviors manifested from the four adaptive modes about physiological needs, self-concept, role function, and interdependence. The nurse needs to determine whether the output behavior of an individual is an adaptive response and contributes to the promotion of health. Identify the ineffective response that occurs in the individual and the adaptive response that needs the help of the nurse to achieve. 2) Assesses the stimuli for those behaviors and categorizes them. At this stage, the nurse will conduct a comprehensive assessment of internal and external stimuli that may affect behavior and identify the focal, contextual, or residual stimuli. 3) Makes a statement or nursing diagnosis of the person’s adaptive state. Attention to the priority of nursing diagnosis, according to the impact of the individual survival, growth, reproduction and the degree of potential to consider and the biggest threat to the individual’s life, it need to be addressed first nursing diagnosis in the first place. 4) Sets goals to promote adaptation. Objective nursing goals are to improve the adaptive level of nursing objects, promote adaptive response of the physiological needs, self-concept, role function and interdependence of nursing objects, change or avoid ineffective response, so as to maintain the health of nursing objects. 5) Implements interventions aimed at managing the stimuli to promote adaptation. The nursing goals were achieved by controlling various stimuli and expanding the adaptive areas of the nursing objects. The control stimulus should not only aim at the main stimulus, but also pay attention to the control of related stimulus and intrinsic stimulus. The ability and characteristics of physiological regulation and psychological regulation should be understood to provide necessary support and help in expanding the adaptive
area. 6) Evaluates whether the adaptive goals have been met. The causes of nursing problems that have not met the expected goals need to be identified in order to determine the continuation of the nursing plan or to modify the nursing plan (Phillips & Harris, 2014).

1.4 The effects of sleep disorders

Sleep disorders are serious enough to interfere with normal physical, mental, social and emotional functioning (Rodriguez et al. 2015). One study found that sleep problem would increase mortality, 80% of the aged had sleep inefficiently, which resulting in twice as many deaths (Prahraj et al. 2018). For sleep disorders in the middle aged and aged adults may cause cognitive impairment, including attention deficits, short-term memory difficulties, increased response time, and decreased performance (Prahraj et al. 2018, Mousavi, Tavabi, Iran-Pour, Tabatabaei, & Golestan, 2012).

1.5 Literature review on related area

Sleep is important for all ages. Some researchers had done some studies on young people, with some good nursing interventions (Ma, Shi, & Deng, 2018, Gipson, Chilton, Dickerson, Alfred & Haas, 2018, Huang, Chang, Hsieh & Lai, 2017). Ma et al. (2018) reported that the cognitive behavioral therapy for insomnia might be effective in the treatment of children and adolescents with insomnia. It was mainly from four aspects (sleep onset latency, wake after sleep onset, total sleep time and sleep efficiency) to judge whether the behavior therapy was effective. Compared to older adults, young people are more likely to experience sleep anxiety from this study. The article of Gipson et al. (2018) showed that the effectiveness of text-massage intervention in promoting sleep hygiene in improving sleep of young college students. The results showed that the self-efficacy of sleep hygiene was an adjustable factor to improve sleep quality. This was similar to other methods to improve sleep quality through external intervention. The article of Huang et al. (2017) aimed to compare the effects of music intervention on subjective and objective sleep quality in adults who with sleep disorders. The results of the study just increased the understanding of the effect on sleep quality for adults with sleep disorders, but the effect on improving sleep quality was not significant. Therefore, Huang et al. (2017) indicated that more studies were needed to demonstrate that music intervention can improve sleep quality in adults with sleep disorders. Compared with the aged adults with sleep disorders, music intervention was beneficial to improve their
sleep quality.

1.6 Problem statement

Some studies had already been done aimed at supporting aged adults with sleep disorders. The aged adults often complained with sleep disorders (Roepke & Ancoli-Israel, 2010). However, sleep disorders were often dismissed as part of normal aging or an incurable disease and it always be ignored. Koch, Haesler, Tiziani and Wilson (2006) published the review, which focused on effectiveness of sleep management strategies for residents of aged care facilities, their review showed that many interventions to promote sleep. Multidisciplinary strategies which including reducing environmental noise, reduce night-time nursing care and promoting daytime activities may be the most effective way to promote sleep (Koch et al. 2006). However, in terms of promoting sleep, this review failed to advise on the effects of other ways on helping one’s sleep. There is a clearly need for further study in these areas.

1.7 Aims and specific question

The aim of the review is to describe how registered nurses can work to support middle aged and aged adults with sleep disorders, with the help of the following question. How can registered nurses work on to support middle aged and aged adults with sleep disorders?

2. Methods

2.1 Design

The authors conducted a descriptive review (Polit & Beck, 2012).

2.2 Search strategy

Articles was found by searching in the databases PubMed, with certain limits including University of Gävle, 10 years, Humans, English, see table1. The search terms were Sleep Disorders, Aged, Middle Aged, nursing, care, support, one by one and in different combinations with each other. When combining search terms, the Boolean term AND, OR was used. Indexed search terms was fetched from MeSH. The authors used “Aged” [Mesh] OR “Middle Aged” [Mesh] AND “sleep disorders” (free text) AND nursing (free text) AND support (free text) to search about 546 articles and used “Aged” [Mesh]
OR “Middle Aged” [Mesh] AND sleep disorders (free text) AND nursing (free text) AND care (free text) to search about 388 articles and used “Aged” [Mesh] OR “Middle Aged” [Mesh] AND sleep disorders (free text) AND care (free text) AND support (free text) AND nursing (free text) to search about 228 articles. Then the authors skim-read the titles or abstracts and selected 30 quantitative articles, deemed to be of potential interest for the review.
Table 1. Results of database searches.

<table>
<thead>
<tr>
<th>Database + Date of search</th>
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<th>Search terms</th>
<th>Number of hits</th>
<th>Potential articles (excluding doubles)</th>
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<td>Medline through</td>
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<td>Total:30</td>
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2.3 Selection criteria

Exclusion criteria for articles were as following: only concerned with physicians’ diagnosis or treatment for sleep disorders, describing the experience with sleep disorders, the sleep disorders caused by diseases in aged adults or the middle aged, qualitative studies, or review studies.

Inclusion criteria for articles that included in the degree project were that they should be relevant for the aim of the review study (that is, registered nurses’ work to support middle aged and aged adults suffering from sleep disorders), empirical scientific articles using a quantitative approach in ten years. And the population must be middle aged (45-59 years old) and aged adults (over 60 years old).

Potential relevant documents identified by literature search (n=30)

→ Documents excluded did not meet the inclusion criteria (n=12)
  Five of these articles are not quantitative articles (n=5), In the seven articles, the age of the population did not meet. (n=7)

Documents retrieved for detailed examination

→ When reading the full articles, 4 articles were found to be irrelevant to the present study’s aim (n=4)

Full-text articles assessed for eligibility (n=14)

→ One article was excluded (There are other diseases in the demographics of the article) (n=1)

Total documents included in integrative review (n=13)

**Figure 1 Flowchart for the selection of eligible studies**

2.4 Selection process and outcome of potential articles

Firstly, the authors skimmed though the titles and abstracts according to the selected articles in order to create an overview of whether they would be useful so as to answer the literature review’s research questions. Later, closer scrutiny of the articles were undertaken in order to determine whether they are relevant for the literature review. The authors were carefully account for every step of the selection process.
2.5 Data analysis

The articles used in the degree project were analyzed with the help of two templates, so called matrixes. In the one of the tables, the authors summarized information about Author(s), Title, Design, Participants, Data collection(s) and Data analysis method(s). And the authors used another one to summarize about Authors, Aim and Results. According to Polit & Beck (2012), using matrixes was a good way to organize the information. The templates were used to review the chosen result aspect. The results sections of the articles were read and carefully processed in order to identify the appropriate approaches to support the middle aged or aged adults with sleep disorders, and judged whether the registered nurse’s work can support the middle aged and aged adults effectively, and integrated and analyzed all intervention. Finally, the authors structured according to categories, and present under the corresponding category.

2.6 Ethical considerations

The articles were read and reviewed objectively, and the authors’ own opinions and attitudes were set a side. The author made an objective analysis and treatment of the results and discussion. The results were presented in their entirety without being altered according to the authors’ wishes. The degree project do not plagiarize (Polit & Beck, 2012).

3. Result

The authors describe the measures of sleep disorders’ assessment used in the included articles to determine whether the following interventions are effective. The results are based on 13 articles with quantitative approaches. The articles present several interventions about middle aged and aged adults with sleep disorders. Classification of nursing interventions are listed as headings in the following paragraphs and are presented in Figure 2. Results are presented in tabular form at the end of the article, see table 2 and table 3.

3.1 Measures of sleep disorders’ assessment

Pittsburgh Sleep Quality Index (PSQI) is a measure of how well you sleep over the course of a month or week (Faydah & Çetinkaya, 2018). In this questionnaire, there are 7 indicators representing the subjects’ sleep quality: sleep quality, sleep latency, sleep
duration, sleep efficiency, sleep disturbance, sleep sufficiency and use of sleep medication (Faydalı & Çetinkaya, 2018, Reza et al. 2010, Zeng et al. 2016, Buysse et al. 2011, El Kady, Ibrahim & Mohamed, 2012). A global PSQI score ranged 5-16 indicates poor sleep quality and ranged 0-4 indicates good sleep quality. Epworth Sleepiness Scale (ESS) is a self-report questionnaire used to assess daytime sleepiness in eight different situations (Zeng et al. 2016). Possible scores for the ESS with eight items range from 0 to 24; the higher the score, the more severe the sleepiness. A score >10 is regarded as “sleepy” and a score ≥ 18 as “very sleepy” (Zeng et al. 2016).

Sleep diary or sleep log can record bed time and rise time, sleep onset latency, wakefulness after sleep onset, and sleep quality (Reza et al. 2010, Buysse et al. 2011). Polysomnography outcome measures included sleep latency, wake after sleep onset, total sleep time and sleep efficiency (Liao, Chiu & Landis, 2008, Richards et al. 2011). Activity monitor can estimate their sleep-awake status. And the data would be to evaluating quality of sleep about sleep latency, total sleep time, duration of long-sleep episode, wake episode after sleep onset, sleep efficiency, diurnal activity mean (Oshima-Saeki, Taniho, Arita & Fujimoto, 2017).

Petersburg’s questionnaire has nine items, these items were adapted into the short-response questions Sleep quality is assessed by the number of points scored (Karimi et al. 2016).

3.2 Interventions

13 articles introduced two types of nursing interventions (professional therapy and daily therapy) for the middle aged and aged adults with sleep disorders. Professional therapy means that it can only be done with the help of professional medical staff and daily therapy refers to the intervention that can be completed by oneself in daily life. There were seven articles for professional therapy which included light therapy, acupressure, aromatherapy, behavior therapy and lower-limb warming. Six articles for daily therapy including music and music video, warm Foot bath and exercise.
Figure 2. Classification of nursing interventions

3.2.1 Professional therapy

**Light therapy:** The study by Wu, Sung, Lee & Smith (2015) used light therapy to sleep disruption. Thirty-four participants in the experimental group received light therapy by professional staffs three times a week for four weeks in front of a 10,000-lux light box about 30 minutes in the morning (Wu et al. 2015). After the experiment, the mean occurrence of sleep disruptions in the experimental group were decreased from 1.95 at week 1 to 0.90 at week 4, and the reduction was significant ($p = 0.02$) (Wu et al. 2015).

**Acupressure:** Two of the articles involved acupressure as an intervention method (Reza et al. 2010, Zeng et al. 2016). Reza et al. (2010) selected more acupoints than Zeng et al. (2016). And the acupressure training’s function was similar. Reza et al. (2010) used acupressure in those acupoints which were Neiguan in hands, Shenmen in the ears and hands, Yungchuan and Sanyinjiao in both feet, and Anmian in the head. Zeng et al. (2016) chose acupoints which were Anmian, Shenmen, Neiguan, and Sanyinjiao. This way was that using the hands to create facial friction, scrape around eyes and massage head, which might stimulate peripheral nerves and increase blood circulation to head.
and face (Zeng et al. 2016). In the article of Reza et al. (2010), there were significant differences between the acupressure group and the control group in the subjective sleep quality (p=0.028), sleep latency (p=0.001), sleep duration (p=0.007), habitual sleep efficiency (p=0.028), sleep disturbance (p=0.013), and sleep sufficiency (p=0.049). Sleep log data showed a significant decrease in nocturnal awakenings in acupressure group compared to other two groups (p =0.017) (Reza et al. 2010). In the article of Zeng et al. (2016), the main effects of the acupressure intervention on PSQI scale and daytime sleepiness (Epworth Sleepiness Scale) were statistically significant (p < 0.01), and the interaction between PSQI and Epworth Sleepiness Scale was significantly affected by time intervention (p < 0.001), indicating that the sleep measurement score of the intervention group was significantly improved over time compared with that of the control group. Over one year of acupressure training and practice, sleep quality, particularly as measured by the PSQI, improved in the experimental group. The average score on PQSI decreased 35%. While sleep quality worsened in the control group, with an increase in PQSI of 16% (Zeng et al. 2016).

**Aromatherapy:** The article by Faydalı and Çetinkaya (2018) reported that aromatherapy through the skin or olfactory system to absorb essential oil could increase comfort, reduce pain and stress, give relaxation and increase the sense of well-being. In this study, the mean PSQI score of the nursing home residents was X = 6.0 -5.1 before aromatherapy, whereas this was found to be X = 2.6 - 3.4 after the application of one week of aromatherapy, indicating a significant improvement in the quality of sleep, and the difference between the mean PSQI scores was statistically significant (P <0.05) (Faydalı & Çetinkaya 2018).

**Behavioral therapy:** There were two articles about behavioral therapy. One was Buysse et al. (2011) which reported the brief behavioral treatment, which including sleep education administered by registered nurses and discussion of homeostatic and circadian mechanisms of human sleep. The educational methods were included: 1) you should reduce time in bed; 2) you must get up at the same time every day, regardless of sleep duration; 3) you do not go to bed unless sleepy; 4) and you do not stay in bed unless asleep (Buysse et al. 2011). The Brief Behavioral Treatment for Insomnia (BBTI) group had later bedtimes, improved sleep quality, and improved sleep onset latency, wake after sleep onset, and sleep efficiency. The BBTI produced significantly better
outcomes in self-reported sleep and health (P<0.001), sleep diary (P<0.001), and actigraphy (P<0.001) (Buysse et al. 2011). The article of El Kady et al. (2012) was cognitive behavioral therapy. That included weekly instructions (including lectures and discussion), and audio-visual instructional materials were used) and sessions. The content was to provide knowledge about health management and sleep hygiene, sleep practices (e.g., regular sleep-wake activity schedule, using bed for sleep only, refraining from caffeine, exercising in the morning) (El Kady et al. 2012). The results showed that after carrying out the behavioral therapy for the elders, the percentage of poor sleepers decreased from 63.3% to 46.2% and the significance at (p<0.05) (El Kady et al. 2012).

**Lower-limb warming:** One article refers to lower-limb warming. Oshima-Saeki et al. (2017) reported that during the first week, participants were asked to wear activity monitors. During the second to ninth weeks, they warmed their lower limbs every night for 40 minutes using a hot pack heated to 42°C. At week 9, they were again asked to wear activity monitors to estimate their sleep-wake status. After testing, Oshima-Saeki et al. (2017) found that lower-limb warming could lead to these changes: wake time after sleep onset decreased (p=0.018), sleep latency decreased (p=0.043) and duration of long-sleep episode tended to be prolonged (p=0.063) (Oshima-Saeki et al. 2017).

3.2.2 Daily therapy

**Music & Music videos:** There were three articles refer to music. (Huang, Chang & Lai, 2016; Lai et al. 2014; Wang, Chair, Wong & Li, 2016). The article of Wang et al. (2016) examined sleep quality by selecting the preferred music when sleeping. After the intervention, the sleep quality of the intervention group continued to improve, with an overall PSQI score of 9.28 in one month, 8.28 in two months and 7.28 in three mouths (Wang et al. 2016). The results of Huang et al. (2016) showed that the combination of soothing music and brisk walking with music had the same effect on subjective sleep quality. The results showed that there were significant differences on the ease of falling asleep, perceived quality of sleep, ease of awakening from sleep, and daytime functioning values (all P < 0.01). Subjective sleep quality was also different when participants listen to soothing music or walk easily while listening to music. Lai et al. (2014) mentioned that a fixed music was studied in this article: the gentle buddhist music video. Sleep quality was tested after the nursing intervention lasted for some time in the three articles. The result showed that sleep-onset latency of participants in MV
condition was shorter than sleep-onset latency under normal care condition, and the significant difference of sleep-onset latency was observed (p =0.002) between the two cases. The results of sleep-onset latency analysis and Wilcoxon’s symbol rank test were used to evaluate the carry-over. For crossed sleep-onset latency, there were significant effects on carrying (p =0.043) (Lai et al. 2014).

**Warm Foot bath:** Only one article mentioned the effect of foot bath on sleep quality (Liao et al. 2008). In this article, the authors mentioned that the subjects were randomly divided into two groups. The participants in intervention group scheduled an hour walk before their normal bedtime. In the study, each participant had a foot bath. Their feet and legs were soaked in warm water (41°C), at an altitude of 40 minutes above the ankle. And the result showed that total sleep time of non-bathing (p=0.95), sleep latency of non-bathing (p=0.28), wake after sleep onset of non-bathing (p=0.65), sleep efficiency of non-bathing (p=0.54), but total sleep time of bathing (p=0.78), sleep latency of bathing (p=0.15), wake after sleep of bathing (p=0.21), sleep efficiency of bathing (p=0.72) (Liao et al. 2008). The higher the DPG (distal-proximal skin temperature gradient), the better the quality of sleep. Warm foot baths improved DPG, but this effect was not retained during sleep (Liao et al. 2008).

**Exercise:** Two articles referred to activity (Karimi et al. 2016, Richards et al. 2011). Karimi et al. (2016) developed an exercise program just for the elderly males in this article. The exercise plan included a 5-minute warm-up and preparation phase, 10-minute of fast walking, 5-minute of slow walking to calm down, and 10-minute of rest and relaxation (Karimi et al. 2016). The sleep quality of the experimental group was significantly reduced (P=0.001), indicating an improvement in sleep quality (Karimi et al. 2016). The article of Richards et al. (2011) introduced that three days a week of high-intensity resistance strength training, two days of walking for 45 minutes (Richards et al. 2011). The sleep efficiency of the adjusted group was 5% higher than that of the control group. A separate paired sample t-test under each intervention condition showed that ESA (exercise and individualized social activity) significantly increased total nocturnal sleep time (P =0.01) (Richards et al. 2011). That meant ESA and E (exercise) all significantly increased sleep efficiency.
4. Discussion

4.1 Main results

Sleep disorders is one of the main reasons that affect one’s work and life. This article summarized the research results of nursing interventions related to sleep disorders for middle aged and aged adults in recent ten years. The review showed that music, music videos, acupressure, aromatherapy, lower-limb warming, behavior therapy and exercise and exercise were mostly common used for improving sleep quality. But, warm foot bath had little effect on the sleep disorders of the middle aged and aged adults.

4.2 Result discussion

Roy’s adaptive model of nursing consisted of six steps: primary assessment, secondary assessment, diagnosis, goal setting, measures and evaluation (Phillips & Harris, 2014). For this reviews, the authors collected the methods to help the middle aged and aged adults with sleep disorders to achieve physiological and social adaptation by controlling the environment. Aging would bring about the degradation of physiological functions and sleep disorders, and the patients might be very anxious about this. According to Roy’s adaptation theory, Roy believed that stimulation was any information that motivates individual responses (Phillips & Harris, 2014). For this articles adopted by the authors, interventions for sleep disorders were all nursing interventions that stimulated participants from the outside. These interventions were within the level of adaptation of the participants, and they had their own coping mechanisms in the face of stimuli, thus regulating the stimuli. Adaptive response was conducive to the promotion of human integrity, while ineffective response was not conducive to maintaining human integrity (Phillips & Harris, 2014). After putting into practice of these interventions, compared to the previous period, the quality of the participants’ sleep was improved, indicating that stimulation was effective for participants.

The mechanism of light therapy was that exposure to strong light inhibited the production of melatonin and help regulate circadian rhythm. Light therapy had the potential to reduce sleep disruption and depressive symptoms and was a feasible intervention to improve the mental health of the aged adults in long-term care settings (Wu et al. 2015). In addition to this, light therapy was a natural, simple treatment with a relatively low cost (van Maanen, Meijer, van der Heijden & Oort, 2016). The
application of light therapy had been successful in clinical practice. The result was consistent with the review of van Maanen et al. (2016), they found that light therapy had a significant effect on a combination of all sleep disorders, as well as on circadian rhythm sleep disorder, insomnia, sleep problems associated with alzheimer’s disease, and other types of sleep problems, suggested that light therapy was effective in reducing some sleep problems and in addition, light therapy does not lead to residual effects or tolerance. However, some side effects can’t be ignored, such as headaches, eye strain, hyperautonomia, and possibly hypomania (van Maanen et al. 2016). They found that light intensity had a significant effect on insomnia, but no significant effect on circadian rhythm sleep disorders and sleep problems related to Alzheimer’s disease and dementia. At the same time, van Maanen et al. (2016) noted that used 2000 -10,000 lux, which might not make much difference in effectiveness (van Maanen et al. 2016). For other aspects, the authors could take wavelength and color temperature into consideration in future research.

Two articles referred to acupressure (Zeng et al. 2016, Reza et al. 2010). Acupressure was believed to stimulate related acupoints, indirectly stimulating meridians, promoting energy flow and thus improving blood circulation. Additionally, massaging these acupoints could also nourish the heart and spleen, regulate the function of many internal organs, balance the energy of Yin and Yang, promote the coordination of the body, and improve the function during the day and the quality of sleep (Zeng et al. 2016). Zeng et al. (2016) found that acupressure could improve sleep quality in older adults during a 1-year period in China. Reza et al. (2010) thought that stimulation of these acupoints might increase a release of serotonin and melatonin relaxes the body, and promote sleep. This conclusion was consistent with the review of Melo et al. (2018), the author advanced that acupressure was beneficial to sleep quality, compared with no treatment. In clinical application, it is suggested that registered nurses use this simple, noninvasive healing method to manage sleep disturbances, and acupressure could be easily taught to patients so that they could manage changes in sleep, reduce adverse health outcomes and improve their quality of life (Reza et al. 2010).

Aromatherapy was the medicinal or therapeutic use of essential oils absorbed through the skin or olfactory system. In the article of Faydali and Çetinkaya (2018), nursing home residents said that aromatherapy was gave by registered nurses with lavender oil
not only regulated their sleep patterns, but also allowed them to get a better rest in the morning, eliminate bad smells, make them feel happy, calm down, and provide a cleansing as well as reducing pain and sleep disruption at night (Faydali & Çetinkaya 2018). This was consistent with the review of Hwang & Shin (2015), the authors expressed that existing aromatherapy appeared to be effective in promoting sleep. Aromatherapy had also become a common intervention because it was less expensive, had fewer side effects than medication, and boosted well-being in recent years. At the same time, it was suggested that it was necessary to develop specific guidelines for the effective use of aromatherapy (Hwang & Shin 2015). In aromatherapy, the most common essential oils used for sleep intervention were lavender and bergamot. Hwang & Shin (2015) concluded that it was difficult to analyze the effects of different essential oils because few papers had been published on the subject, and aromatherapy was also effective for depression or anxiety. In the use of aromatherapy therapy, massage was the most commonly used method, followed by direct inhalation and indirect inhalation (Hwang & Shin 2015).

The pooled analysis of 2 studies suggested that behavioral therapy was beneficial to improve the sleep quality of aged adults, which aimed to improve sleep by changing poor sleep habits and challenging negative sleep thoughts, attitudes and beliefs (Buysse et al. 2011, El Kady et al. 2012). Comparing that to a study did by Ma et al. in 2018, the authors found that cognitive behavioral therapy was effective not only for the middle-aged and aged adults, but also for children and adolescents. And Ma et al. (2018) verified that cognitive behavioral therapy was effective in improving the parameters and symptoms of insomnia. They also demonstrated that cognitive behavioral therapy could effectively improve sleep onset latency and sleep efficiency in these patients, and could effectively treat anxiety symptoms. However, Ma et al. (2018) found that there were no significant improvements about wake after sleep onset and total sleep time for children and adolescents according to the results of actigraphy and sleep logs. With behavioral therapy, older adults were able to sleep longer and have better sleep quality, with sleep onset latency, wake after sleep onset and sleep efficiency all improved (Buysse et al. 2011).

Music was a safe and effective non-pharmacological intervention with significant effects in improving sleep quality for aged adults in the community (Wang et al. 2016).
Soothing music was used as an adjuvant therapy to improve sleep quality. It was proved that music showed beneficial effects on subjective sleep quality for aged adults with insomnia (Huang et al. 2016, Lai et al. 2014, Wang et al. 2016). These results were consistent with the articles of Melo et al. (2018) and Huang et al. (2017). The articles of Melo et al. (2018) and Huang et al. (2017) showed that music impacted on different population, it also improved the quality of sleep in young people with sleep disorders. Registered nurses could teach the aged adults what kind of music and when to listen to maximize the effect of intervention. And Melo et al. (2018) stressed that such interventions were easy to implement. However, the evidence provided by these studies was insufficiently accurate, which meant that it was likely that further studies may change the current evidence.

Registered nurses could tell about the benefits of a warm foot bath and the appropriated temperature for the middle aged and aged adults. A warm foot bath could promote blood circulation, warm the viscera and prevent diseases (Cai-fen & Chen-xi, 2014). It passed through the tepid heat of hot water to promote metabolism (Cai-fen & Chen-xi, 2014). A warm foot bath was thought to help dissipate heat to the lower core (rectum) body and abdomen, increase foot temperature, improve objective and perceived sleep outcomes (Cai-fen & Chen-xi, 2014, Oshima-Saeki et al. 2017). Liao et al. (2008) and Cai-fen & Chen-xi (2014) all showed that participants took a foot bath for an average of 30 minutes, with water temperature ranging from 38 to 40 degrees, until they experienced a slight sensation of body warmth (Liao et al. 2008, Cai-fen & Chen-xi, 2014). However, the article of Liao et al. (2008) was not consistent with the review of Cai-fen & Chen-xi (2014). Because the increased temperature of the foot bath was lost during sleep, that did not have a significant effect on sleep. And in the article of Oshima-Saeki et al. (2017), the participants accepted a 40-minute warm limb treatment with a 42 °C hot water bag every night. Liao et al. (2008) showed that warm foot bath had a significant effect on the improvement of sleep quality. Nevertheless, in the review of Cai-fen & Chen-xi (2014), foot bath could significantly improve the sleep quality of the aged adults. However, for some aged adults with various disabilities, which had severe behavioral problems, which were contractures, venous disease, peripheral neuropathy and communication disorders, it was difficult to take a hot foot bath every night before sleeping in the nursing home. In the article of Oshima-Saeki et al. (2017), hot-pack boots to warm the lower limbs could replace hot foot baths. This was easier for middle
aged aged adults. The operation was simple, and could be used for a long time with no dependence, thus could be adopted in community health care centers (Cai-fen & Chen-xi, 2014).

Exercise was the power of life. Registered nurses could guide how to exercise so that exercise could not only enhance physical constitution but also improve sleep quality for the middle aged and aged adults. High intensity physical resistance, strength training and walking combined with social activities had significantly improved the quality of sleep in nursing homes and assisted living residential areas (Richards et al. 2011, Karimi et al. 2016). In the article of Karimi et al. 2016, the authors suggested that physical activity could be added to daily routine of aged adults to improve sleep quality. However, in the nursing home, there were many frail old people who couldn’t complete the high-intensity physical training, so their compliance was poor (Richards et al. 2011). Melo et al. (2018) showed that physical exercise was benefit for adults aged 60 or above who had sleep disorders to improve the sleep quality. This result was consistent with the articles of Karimi et al. (2016) and Richards et al. (2011). However, the article of Miura et al. (2015) compared that the sleep quality in active and sedentary people and found that regular daily exercise did not always have a significant positive effect on nighttime sleep, because exercise made the body temperature increase before sleep, which seemed to be no decline in body temperature during the few hours before sleep, such residual hyperthermia might offset the positive effect of exercise on sleep (Miura et al. 2015).

4.3 Methods discussion

Literature reviews were based on one database: Medline. The wider the search scope of these databases, the richer the data obtained and the higher the authenticity, making the literature sought by the authors more comprehensive and of higher research value. According to Polit & Beck (2012), the inclusion criteria and exclusion criteria for the literature selected by the authors were clear. In order to find better research methods and more evidence, the authors had read a great deal of literature. Thus the literature within ten years were selected, which excluded the repetition of useless research by predecessors. These results were objective. And it did not be changed according to the authors’ will, which could provide rich and persuasive facts and data for scientific proof of this review’s views, so that the research conclusion could be based on a reliable material (Polit & Beck, 2012).
The study objects selected by the authors came from six different countries: America, Egypt, Taiwan, China, Iran, and Japan, which reinforced the global portability literature review of the study.

One of the limitation was the literature must be written in English. English is not the authors’ mother tongue. Therefore, in the process of reading the literature, the authors might misunderstand the point of views and make it more difficult for the authors to read.

The authors chosen to study the middle aged and aged adults who had no other diseases but sleep disorders. But clinically, the middle aged and aged adults with sleep disorders were mostly suffering from underlying diseases. Therefore, the intervention measures summarized in this review had certain limitations for clinical application.

4.4 Clinical implications

The literature review of this paper shows how registered nurses can work to support middle aged and aged adults with sleep disorders. The authors reviewed nearly a decade of literature to provide more comprehensive and updated data than ever before. In this review, the authors found that registered nurses can use more of these two methods about listening to soothing music and exercising to help middle aged and aged adults deal with their sleep disorders, because these two methods are the most effective.

Lower-limb warming is the most convenient for registered nurses to work for their sleep problems. Through the study of effective measures, it can guide clinical and community registered nurses to do a good job in middle aged and aged adults sleep disorders care, help them to actively deal with sleep disorders, to ensure that they can enjoy their old age in a healthy and happy life. At the same time, it also allows registered nurses to pay more attention to the basic quality of life of patients while focusing on treatment, so as to carry out better nursing.

Registered nurses improve sleep quality of the middle aged and aged adults, can avoid unnecessary waste of medical resource and improve therapeutic effect. At the same time, it can also promote the healthy aging of the aged adults, improve the quality of elderly life, and promote social harmony.

4.5 Suggestions for future research

In this study, it found that the participants in the selected literature were healthy middle-aged and aged adults. In the future, the authors can try to study intervention methods for
people with diseases. And the authors included articles from different countries, the middle aged and aged adults had different levels of education, the effect of the intervention they receive would also vary. Therefore, consistent cultural background can be selected in future studies to reduce errors. And the number of articles included by the author is limited, the interventions summarized were all effective for sleep disorders in middle-aged and older adults. Therefore, these interventions need to be validated whether are really effective in future studies.

5. Conclusions

Sleep disorder is one of the most common symptoms of the middle aged and aged adults. Long-term repeated sleep disorders may affect the treatment and rehabilitation of the primary disease of the middle aged and aged adults, aggravate or induce some physical diseases, and is an important factor threatening the physical and mental health of the middle aged and aged adults. The authors introduced eight ways of nursing interventions for the middle aged and aged adults with sleep disorders. These interventions are included in light therapy, acupressure, aromatherapy, behavior therapy, lower-limb warming, music and music videos, warm foot bath and exercise. All of these interventions had effective except for foot baths.
6. Reference


World Health Organization (WHO) Definition of Age (1994).


Table 2 overview of selected articles

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Design (possibly approach)</th>
<th>Participants</th>
<th>Data collection method(s)</th>
<th>Data analysis method(s)</th>
</tr>
</thead>
</table>
| Buysse D.J. et al. | Efficacy of Brief Behavioral Treatment for Chronic Insomnia in Older Adults | Randomized Clinical Trials with a quantitative approach | Number: 79  
Age: mean age: 71.7 years  
Women: (n=54)  
Men: (n= 25)  
Brief behavioral treatment for insomnia (BBTI) group: (n=39) ; Information control (IC) group: (n=40)  
A convenience sample of older adults with chronic insomnia was recruited from a single primary care practice or from the community via advertisements. Participants were diagnosed with primary insomnia, no mental illness and other disease, no medication or treatment. | Questionnaires and structured clinician interviews, sleep diary, actigraphy, and polysomnography (PSG) | T tests, χ² tests, and Fisher Exact statistics. |
<table>
<thead>
<tr>
<th>Study</th>
<th>Title</th>
<th>Year of publication</th>
<th>Country</th>
<th>Design</th>
<th>Sample</th>
<th>Population</th>
<th>Analysis</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
<td>El Kady H.M. et al.</td>
<td>Cognitive behavioral therapy for institutionalized elders complaining of sleep disturbance in Alexandria, Egypt</td>
<td>2012</td>
<td>Egypt</td>
<td>A pretest-post test design approach with a quantitative approach</td>
<td>210</td>
<td>Age: 60 years and older, mean age: 72.2±5.3 years</td>
<td>Wilcoxon test, Stepwise multiple linear regression analysis</td>
<td>The participants were select from 15 elderly homes in Alexandria and with no mental illness and other disease.</td>
</tr>
<tr>
<td>Faydah S. &amp; Çetinkaya F.</td>
<td>The Effect of Aromatherapy on Sleep Quality of Elderly People Residing in a Nursing Home</td>
<td>2018</td>
<td>North American</td>
<td>Conducted with pretest and post test applied to same group with a quantitative approach</td>
<td>30</td>
<td>Age: n &lt; 65 9, n ≥ 65 21</td>
<td>Sample t test, 1-way analysis of variance</td>
<td>The participants were select from a Nursing Home in North American and 24 participants have a health problem, 6 participants have no health problems.</td>
</tr>
<tr>
<td>Study</td>
<td>Title</td>
<td>Description</td>
<td>Population Details</td>
<td>Methodology</td>
<td>Statistical Analysis</td>
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<tr>
<td>Huang C.Y. et al.</td>
<td>Comparing the effects of music and exercise with music for older adults with insomnia</td>
<td>A randomized controlled crossover trial with a quantitative approach</td>
<td>Numbers: 38 &lt;br&gt; Age: 50-70 (mean age = 56.42 years) &lt;br&gt; Male: 8; Female: 30 &lt;br&gt; The participants who were community-residing older adults with chronic initiating and the maintaining of sleep complaints.</td>
<td>Electroencephalography (EEG) and questionnaires</td>
<td>The generalized estimating equation (GEE) method, ANOVA, The post hoc t tests</td>
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<tr>
<td>Karimi S. et al.</td>
<td>Surveying the effects of an exercise program on the sleep quality of elderly males</td>
<td>A semi-experimental study with a quantitative approach</td>
<td>Numbers: 46 &lt;br&gt; Age: &gt; 60 years &lt;br&gt; All of them were male &lt;br&gt; Experimental group: (n=23); Control group: (n=23) &lt;br&gt; The mean of age of the experiment and control groups was 67.49 and 66.82 years.</td>
<td>Questionnaire, Petersburg’s questionnaire, monitor the physical strength and vital signs</td>
<td>Mean, standard deviation, chi-square test, Wilcoxon and Mann–Whitney tests for quantitative data by SPSS20 software.</td>
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</table>
| Lai H.L. et al. | Effects of Music Videos on Sleep Quality in Middle-Aged and Older Adults With Chronic Insomnia: | Number :38  
Age:50-75 Mean age: 59.61  
Female: 33  Male: 5  
The participants with sleep disturbances have no mental illness and other disease. | a screening questionnaire, interview through microphone | PASW 18.0, Generalized estimating equation (GEE), Wilcoxon’s signed rank test |
|---|---|---|---|---|
| Liao W.C. et al. | A Warm Foot bath before Bedtime and Sleep in Older Taiwanese with Sleep Disturbance | Numbers: 15  
Age: 60-75, mean age: 67.4  
Female: 9  Male: 6  
The participants come from North Taiwan and complain of sleep difficulties without mental illness and other disease. | Polysomnography (PSG) screening for evidence, Polysomnography (PSG) sleep variables | A Bonferroni correction, Paired t-tests |
| Oshima-Saeki C. et al. | Lower-limb warming improves sleep quality in elderly people living in nursing homes | A prospective cohort study with out controls with a quantitative approach | Number: 7 (all women)  
Age: between 74-93 years old (mean age 87± 8.53).  
They were from the same nursing home to avoid differences in life patterns. Only 6 subjects had some degree of dementia, but they did not have any severe behavioral problems, contractures, venous disease, peripheral neuropathy and communication disorders. | Activity monitor (Actigraph, AMI Inc., Ardsley, NY, USA) | Wilcoxon signed-rank test. |
<table>
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<tr>
<th>Reza H. et al.</th>
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<tr>
<td><strong>The effect of acupressure on quality of sleep in Iranian elderly nursing home residents</strong></td>
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<tr>
<td><strong>Number:</strong> 77</td>
</tr>
<tr>
<td><strong>Age:</strong> aged 60 years or older (mean age 75.21)</td>
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<tr>
<td><strong>Male:</strong> (n=41) ; <strong>Female:</strong> (n=36)</td>
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<tr>
<td><strong>Acupressure group:</strong> (n=25) ; <strong>Sham acupressure group:</strong> (n=26) ; <strong>Control group:</strong> (n=26)</td>
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<td>They were from a nursing home in Tehran-Iran. And they had no other diseases.</td>
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<td><strong>The Pittsburgh Sleep Quality index (PSQI) questionnaire, a sleep log.</strong></td>
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<td><strong>Descriptive statistics, Chi-Square test, Paired t-test, willkakson sign-rank test, ANOVA, Repeated measure ANOVA, ANCOVA and the Kruskal – Wallis test</strong></td>
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</tbody>
</table>
| Richards K.C. et al. | Strength Training and Walking Exercise and Social Activity | Randomized controlled trial with a quantitative approach | Number: 193  
Age: age ≥ 55 years old  
Women: (n=116)  
Men: (n=77)  
Exercise (E) group (n=55) ; Social activity (SA) group (n=50) ; Combined Exercise and Social activity (ESA) group (n=41) ; usual care control (n=47)  
Participants were from 10 nursing homes and 3 assisted living centers were approached. And they were diagnosed with chronic insomnia without others diseases. | A Grass Portable Polysomnography System (Astro-Med, Inc., West Warwick, RI)  
Stata regression algorithm, ANCOVA, t-tests |
| --- | --- | --- | --- | --- |
| Wang Q. et al. | The Effects of Music Intervention on Sleep Quality in Community-Dwelling Elderly | Two-armed randomized controlled trial with a quantitative approach | Number: 64  
Age: age 60 years or older  
Male: 13 ; Female: 55  
Intervention group: (n=32) ; Control group (n=32)  
The participants come from four urban communities in Xi’an, China. They are without mental illness and other disease. | A structured questionnaire, Telephone follow-up  
The independent t-test, chi-square test |
| Wu M.C. et al. | The effects of light therapy on depression and sleep disruption in older adults in an long-term care facility | A quasi-experimental pretest and post test design with a quantitative approach | Number: 65  
Age: 65 years and above  
Male: (n= 37)  
Female: (n= 28)  
Experimental group: (n=34); control group: (n=31)  
Participants were recruited from four units within this facility. The four units provided the same services so there no differences in life patterns. They were not bind and had no obvious of acute pain or infection. | Demographic data were collected by the research assistants from participants’ records.  
Depression was measured using the short-form Geriatric Depression Scale (GDS-SF), Sleep disruption were measured by a daily sleep recording sheet. | Descriptive statistics, independent t-test |
<table>
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<tr>
<th>Zeng H. et al.</th>
<th>Year of publication: 2016</th>
<th>Country: China</th>
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</table>

**The Effects of Acupressure Training on Sleep Quality and Cognitive Function of Older Adults: A 1-Year Randomized Controlled Trial**

- **Number:** 82
- **Age:** aged 60 years or older
- **Male:** (n= 24)  **Female:** (n= 58)
- **Experimental group:** (n= 42)  **Control group:** (n= 40)
- These old adults all come from a community in China. They were healthy enough to accept this intervention.

**General information questionnaire, Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale (ESS), Mini-mental state examination, Wechsler Memory Scale revised, Chinese version**

**T-tests or chi-square tests, variance (ANOVA), Mediation analysis, PSQI, MMSE, a value.**
### Table 3 overview of selected articles aims and main results

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Aim</th>
<th>Results</th>
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<tbody>
<tr>
<td>Buysse D.J. et al.</td>
<td>The specific aim of this study was to test the short-term efficacy and 6-month durability of brief behavioral treatment for insomnia (BBTI) vs an information control (IC) intervention among older adults with insomnia.</td>
<td>Categorically defined response (P&lt; 0.01) and the proportion of participants without insomnia (P&lt; 0.01) were significantly higher for BBTI than for IC. The BBTI group had significantly better outcomes than the IC group (P&lt; 0.01). The BBTI produced significantly better outcomes in self-reported sleep and health (P&lt; 0.001), sleep diary(P&lt; 0.001), and actigraphy (P&lt; 0.001).</td>
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<tr>
<td>El Kady H.M. et al.</td>
<td>The aim of this study was to determine the prevalence of insomnia, factors affecting it, and the impact of a cognitive behavioral therapy for institutionalized elders complaining of sleep disturbance in Alexandria, Egypt</td>
<td>The results show that after carrying out the behavioral therapy for the elders, the percentage of poor sleepers decreased from 63.3% to 46.2% and the significance at p &lt; 0.05.</td>
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<tr>
<td>Author(s)</td>
<td>Year of publication</td>
<td>Country</td>
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<tr>
<td>Faydah S. &amp; Çetinkaya F.</td>
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<td>Taiwan, China</td>
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<td>Country</td>
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<tr>
<td>Karimi S. et al.</td>
<td>2016</td>
<td>Iran</td>
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<td>Lai H.L. et al.</td>
<td>2014</td>
<td>Taiwan, China</td>
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<td>Author(s)</td>
<td>Year of publication</td>
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<tr>
<td>Liao W.C. et al.</td>
<td>2008</td>
<td>Taiwan, China</td>
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<tr>
<td>Oshima-Saeki C. et al.</td>
<td>2017</td>
<td>Japan</td>
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<td>Authors</td>
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<td>Country</td>
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<tr>
<td>Reza H., Kian N. et al.</td>
<td>2010</td>
<td>Iranian</td>
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<td>Richards K.C. et al.</td>
<td>2011</td>
<td>America</td>
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<td>Author</td>
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</table>
| Zeng H. et al.  
| Year of publication: 2016  
| Country: China | The study was to explore the effects of acupressure training on older adults’ sleep quality and cognitive function. | The interaction effect of time intervention was significant for sleep quality (PSQI) and daytime sleepiness (ESS) ($p < 0.001$), indicating the intervention group scores on the sleep measures showed more improvement over time than did the control group. Over 1 year of acupressure training and practice, sleep quality, particularly as measured by the PSQI, improved in the experimental group. The average score on PQSI decreased 35%. While sleep quality worsened in the control group, with an increase in PQSI of 16%. |