



Pharmacological and nonpharmacological treatment for insomnia in hospitalized older adults: A systematic review

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Abstract

Insomnia causes a huge socioeconomic burden among the elderly and is not simply a health problem. This study aimed to compare Pharmacological and nonpharmacological treatment for insomnia in hospitalized older adults through A systematic review. The databases MEDLINE, PUBMED, Google Scholar, and COCHRANE LIBRARY were used in the compressive search, together with the keywords "insomnia," "hospitalised older adults," and "pharmacological/non-pharmacological treatments." Additionally, we will look through cited reference materials, conduct in-person interviews with multiple subject-matter experts, and perform additional searches of the most recent contents, strongest supporting data, and prior. Eight studies in all met the requirements for inclusion and were featured in the final systematic review. After the intervention, there was a significant difference in the mean sleep quality scores between the experimental and control groups (P 0.001) between the two groups They demonstrated that giving chamomile extract orally to nursing home patients who are hospitalised can enhance their quality of sleep. It can therefore be utilised in nursing care and other situations of a similar nature. According to the study's findings, non-pharmacological therapies may greatly enhance patients' ability to sleep while they are in the hospital. In order to accomplish this, it may be necessary to move the morning rounds for vital sign checks and medicine administration from the night shift to the day shift. Due to the dearth of prior research on the subject, our study may have certain limitations.

Keywords:

Full length article *Corresponding Author, e-mail: m2j09@outlook.com

1. Introduction

Insomnia means feeling unhappy about either not getting enough sleep or not having good quality sleep. This often has to do with having trouble falling asleep, having trouble staying asleep with lots of waking up, and having trouble falling back to sleep in the early morning [1]. The DSM-5 says that a sleep problem must cause real problems and happen at least three nights a week for at least three months, even if there is enough time to sleep. The ICD-10 says that there must be symptoms for at least one month that can't be explained by another sleep problem. The ICD-10 still has the "nonrestorative sleep" criteria, even though the DSM-5 doesn't consider it a symptom for diagnosis. When a person has trouble sleeping, their body and mind are in a state of being highly alert, both when they are asleep and when they are awake. Hyperarousal means being very alert and awake

during sleep. It is identified by high levels of cortisol and adrenocorticotrophic hormone, increased metabolism even when asleep, and reduced heart rate variability [2]. The third edition of the International Classification of Sleep Disorders (ICSD-3) and the DSM-5 recognized a significant change in how sleep disorders are classified. The ICSD-3 says that insomnia is when someone has trouble falling or staying asleep and it affects them during the day, not because of bad sleeping conditions or their surroundings. When someone has other health problems along with their trouble sleeping, the way we categorize different types of insomnia changes. We use a more general category to describe the condition [3]. Most patients who have trouble sleeping and need rest to recover from their illness are those who are in the hospital. Not getting enough sleep in hospitals can cause problems for

patients, such as confusion, high blood pressure, and high blood sugar levels[4].

The phrase "post-hospital syndrome" was made to get people's attention about the more than 3 million older adults who were hospitalized for reasons not related to their original illness. Although there haven't been many studies about the long-term effects of not sleeping enough during hospital stays, losing sleep in the hospital has been recognized as a potential cause of post-hospital syndrome [5]. When people are in the hospital, they may have trouble sleeping and it doesn't get better after they leave. In fact, 40% of patients with certain medical problems are likely to have breathing problems while they sleep. This information is based on previous studies. Lack of sleep has been connected to worse heart and metabolic health outcomes in hospitals[6]. Because of this, hospitals have the chance to find and treat sleep problems that have not been noticed before. They can also improve the sleeping conditions for better rest while a patient is there and even after they leave. This might help reduce the number of times patients have to come back to the hospital when it is not necessary [7]. When we talk about older people in the hospital not being able to sleep well, it is important to consider how their sleep patterns change compared to healthy older adults. Older people have less deep sleep, more light sleep, wake up more often during the night, have less REM sleep, and sleep for a shorter amount of time. Furthermore, older people are more commonly affected by insomnia. Furthermore, elderly individuals in hospitals can easily be disturbed in their sleep by things like noise or light. Sleep quality gets worse when sleep becomes fragmented. Older people usually go to bed and wake up earlier because of their sleep-wake cycle, and their sleep patterns are easily disrupted. These changes happen to almost all older people, regardless of any mental or physical conditions [5]. Older people may find it hard to fall asleep due to feelings of worry, sadness, loneliness, physical discomfort, and sudden illness. Sleep problems in older patients should be seen as a common issue for older adults. It is important to make sure older patients get enough sleep, especially when going into or leaving the hospital. Unfortunately, it is often hard to sleep well in the hospital [8]. There are many different ways to treat sleep problems, including medications and other treatments that don't involve drugs. Many older people use medications called sedatives, like benzodiazepines or z-drugs. Even though people's preferences have changed over time and there are new options available, these medications are still commonly used [9].

Older people are more likely to experience side effects from medications because of changes in their brain, how their body processes drugs, and the presence of other health conditions. Sleep deprivation and sedative drugs can have harmful effects on the body. Some of these effects are the increased chance of broken bones and falling, excessive sedation, and feeling confused[10]. Many experts think that it is better to use non-drug methods to treat older people with sleep problems. Acupuncture, music therapy, bright-light therapy, yoga, and other methods that aim to change beliefs and actions related to sleep, like good sleep habits, relaxation techniques, or therapy that focuses on thoughts and behaviors, are examples of other treatments that don't involve medication [3]. This study looked at the best way to help older adults in hospitals who have trouble sleeping. Insomnia is bad for their health, so the researchers wanted to find the most

helpful treatment. They looked at both medicine and other treatments. Not many studies have been done on this topic, even though sleep problems are common in older adults in hospitals.

2. Materials and Methods

2.1 Data extraction

Data from studies that fit the inclusion criteria were examined. We examined the variety of the included studies' subjects, methodologies, and intervention outcomes. This allowed us to decide if results from several trials could be combined.

2.2 Search strategy for identification of studies

The databases MEDLINE, PUBMED, Google Scholar, and COCHRANE LIBRARY were used in the compressive search, together with the keywords "insomnia," "hospitalised older adults," and "pharmacological/non-pharmacological treatments." Additionally, we will look through cited reference materials, conduct in-person interviews with multiple subject-matter experts, and perform additional searches of the most recent contents, strongest supporting data, and prior reviews.

2.3 Criteria of eligibility of an article

When a piece of writing concerned: English-language original article published between 2000 and 2023, it was determined to be eligible.

Types of studies: Case-control studies, quasi-experimental clinical trials, double-blind, placebo-controlled trials, case-crossover studies, controlled randomised trials, and nonrandomized controlled trials are examples of case-control studies.

Type of participants: The effects of pharmaceutical and non-pharmacological therapies for insomnia will only be included in research on human subjects (hospitalised older individuals).

3. Methods of the review

- Finding and choosing studies: Studies were found in search engines like PubMed and Google Scholar between the years of 2000 and the present.

- These search engines were only used to look up research in English.

3. Results and discussion

3.1 Results

a) Description of included studies

A preliminary database search turned up 6588 records. 220 potentially suitable articles were found after duplicates were removed. Eight studies in all met the requirements for inclusion and were featured in the final systematic review (Figure 1).

b) Types of included studies

Two case-control studies, one double-blind, placebo-controlled clinical trial, one case-crossover study, one clinical trial with a quasi-experimental design, one with a nonequivalent design, one controlled randomised trial, and one nonrandomized controlled trial are included in the table 2 (see below).

c) *Quality Assessment tools*

The Newcastle-Ottawa questionnaire for observational research and the Cochrane risk-of-bias tool for clinical trials were both used by the investigator to assess the risk of bias. For both observational studies and RCTs, we only included studies that had Newcastle-Ottawa questionnaire scores of at least 6 and that were deemed to have a "low risk" of bias in each of the domains.

Discussion

Our systematic study, to the best of our knowledge, is the first to assess the most efficient treatment for insomnia in hospitalised older persons, whether pharmaceutical or nonpharmacological therapy, as In addition to issues with mental health, one of the most fundamental human needs is sleep, which if disrupted in any way lowers performance. Sleeping issues are a common complaint among elderly persons. The risk of adverse health outcomes, including early morbidity and mortality, cardiovascular disease, carer load, deficits in daily functioning and cognitive functioning, low quality of life, and the emergence of clinical insomnia, increases with moderate sleep disruptions in older persons.

We included two Case-control studies, one Double-blind, placebo-controlled clinical trial, one Case-crossover study, one quasi-experimental clinical trial, one nonequivalent design, one controlled randomized trial and one nonrandomized controlled trial. As far as we are aware, there are no studies that specifically address the best way to treat insomnia in hospitalised older people. We therefore undertook this investigation to ascertain the most efficient treatment, whether pharmacological or nonpharmacological, for insomnia in hospitalised older persons. In a study by Wang et al. [11] health care utilisation data from 4,888 comparison patients and 1,222 patients with hip fractures who were at least 65 years old, enrolled in Medicare, New Jersey Medicaid, or Pharmaceutical Assistance to the Aged and Disabled programmes were analysed. Based on age and gender, the comparator patients were matched with the hip fracture patients. Before the index date, which was either the date of hospital admission for hip fracture surgical repair or a date chosen at random for the comparison participants that matched the frequency of the hip fracture patients, the study evaluated the usage of benzodiazepines and other factors. They discovered that the adjusted risk of hip fracture was considerably elevated by 50% for all benzodiazepine dosages below 3 mg/day in diazepam equivalents. Hip fracture chances significantly rose during the first two weeks of usage (by 60%), as well as after more than a month of continuous use (by 80%), but not during the first four to six weeks. Compared to long-acting medications, the use of other benzodiazepines dramatically raised the risk of hip fracture by 50%. They found that benzodiazepine medication tended to raise the risk of hip fracture even at moderate dosages, even

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those low levels often recommended in prescription recommendations for elderly patients. Patients appear to be more sensitive after starting medication and continuing it for more than a month. Shorter half-lived benzodiazepines don't seem to be any safer than those with longer half-lives. When prescribing for elderly patients, clinicians should be aware of these dangers and balance them against any potential benefits. Chang et al. [12] conducted a study to ascertain the association between medical conditions, prescription medications, and elderly hospitalised patients' risk of falling. In a large university hospital in 2006, they selected 165 senior patients (65 years of age or older) who had fall incidents reported to the Taiwan Patient-Safety Reporting System. Each participant was individually (1:1) matched to the non-faller control group for gender, age, and length of hospitalisation. The comparison of the cases and controls using bivariate and multivariate logistic regressions was done to ascertain whether there was a connection between the cases' medical conditions and their exposure to medications in the days leading up to their falls. Bivariate research suggests that older cancer patients or those who have used drugs like Zolpidem, benzodiazepines, opioids, or antihistamines are at increased risk of developing the disease. They discovered that both benzodiazepine dosages of 1 mg/day in diazepam equivalents and benzodiazepines were remained significantly associated with the falls of senior hospital patients (OR = 2.26, 95% confidence interval (CI) = 1.21-4.23 and OR = 2.14, 95% CI = 1.04-4.39, respectively). They showed how important it is to limit Zolpidem, benzodiazepines, opioids, and antihistamine use to prevent falls in elderly hospital patients.

Rondanelli et al. [13] investigated if providing melatonin, magnesium, and zinc to residents at long-term care homes would alleviate their primary insomnia. The trial included 43 primary insomniacs between the ages of 78.3 and 3.9, with 22 in the supplemented group and 21 in the placebo group. Participants took either a dietary supplement (5 mg melatonin, 225 mg magnesium, and 11.25 mg zinc coupled with 100 g of pear pulp) or a placebo (100 g of pear pulp) every day for eight weeks before bed. The major tool for evaluating sleep quality was the Pittsburgh Sleep Quality Index. The Epworth Sleepiness Scale, the Leeds Sleep Evaluation Questionnaire (LSEQ), the Short Insomnia Questionnaire (SDQ), and other measures of quality of life were used as secondary endpoints in the Medical Outcomes Study. Total sleep duration was estimated using a wearable sensor in the form of an armband. At baseline and 60 days later, all measurements were obtained. They found that the dietary supplement significantly outperformed the placebo in terms of overall PSQI scores (difference between groups in change from baseline PSQI score=6.8; 95% confidence interval=5.4-8.3, P.001). Additionally, the significant improvements in all four domains of the LSEQ (ease of falling asleep, quality of sleep, hangover upon waking from sleep, alertness and behavioural integrity the following morning, P=.001), as well as the SDQ score, overall quantity of sleep, and SF-36 physical score, show that the treatment was successful in enhancing the restorative value of sleep. They consequently discovered that giving melatonin, magnesium, and zinc daily to long-term care facility clients with primary insomnia proved to improve their sleep and quality of life. To find out if taking zolpidem, ezopiclone, and

zaleplon increased the risk of hip fracture and traumatic brain injury (TBI), Tom et al. [10] looked into the possibilities. On a 5% random sample of Medicare recipients 65 years of age or older who were admitted to the hospital for either a hip fracture (n = 37,833) or a traumatic brain injury (n = 15,031), a case-crossover study was conducted. The use of Zolpidem, Eszopiclone, or Zaleplon in the thirty days prior to the hospitalisation for an injury was compared to use in four control intervals at three, six, nine, and twelve months earlier. The major outcome was hospitalisation for a hip fracture or a TBI. They found that taking Zolpidem a month before an accident increased the risk of suffering a traumatic brain injury (TBI) (odds ratio [OR] 1.87; 95% confidence interval [CI] 1.56, 2.25); whereas, taking Eszopiclone during the same time period had no such effect (OR 0.67; 95% CI 0.40, 1.13). While zolpidem use in the month prior to injury was associated with an increased risk (OR 1.59; 95% CI 1.41, 1.79), eszopiclone use during the same time period was not (OR 1.12; 95% CI 0.83, 1.50). There was no proof, according to this analysis, that using Zaleplon in the month before an accident increased the risk of a traumatic brain injury (OR 0.85; 95% CI 0.21, 3.34) or a hip fracture (OR 0.92; 95% CI 0.40, 2.13). The analysis was limited, nonetheless, due to the modest drug use. They came to the conclusion that, in terms of injuries caused by falls, Eszopiclone may provide older patients with insomnia a safer alternative to Zolpidem. The objective of the study by Abdullahzadeh et al. [14] was to determine how *Matricaria chamomilla* extract affected the quantity and quality of sleep among elderly patients admitted to nursing homes in Isfahan in 2014. It was a study with features of a clinical trial. The study population consisted of 77 elderly patients who were hospitalised in nursing homes. Participants were selected by random continuous sampling and divided into intervention and control groups. The intervention group consumed chamomile 400 mg oral capsules twice daily, after lunch and after dinner, for four weeks. The control group did not receive the intervention.

Prior to and following intervention, the older population's sleep quality was evaluated using the Pittsburgh Sleep Quality Index questionnaire. Descriptive statistics, independent and paired t-tests, one-way analyses of variance, and linear regression analysis were employed to assess the data using SPSS software version 17. Prior to intervention, they found that there was little difference in the mean sleep quality scores between the experimental and control groups ($P > 0.05$). After the intervention, there was a significant difference in the mean sleep quality scores between the experimental and control groups ($P 0.001$) between the two groups. They demonstrated that giving chamomile extract orally to nursing home patients who are hospitalised can enhance their quality of sleep. It can therefore be utilised in nursing care and other situations of a similar nature. Han et al. [15] examined the effects of laughing therapy on patients' levels of sorrow and sleep at two long-term care (LTC) hospitals. 42 people from two LTC facilities participated in this study. 21 patients at one long-term care hospital had laughter therapy as a control group, while 21 residents at the second LTC institution did not receive any treatment. Singing funny songs, laughing to distract oneself, stretching, engaging in hand games and dance routines, laughing

exercises, healthy clapping, and out loud laughing were all part of the laughter treatment programme. For a total of eight sessions, the approach was applied to the participants twice a week on Monday and Thursday for 40 minutes at a time. In terms of depression and sleep, the results demonstrated that the treatment group outperformed the comparison group ($t = -7.12$, $p.001$; $Z = -4.16$, $p.001$). They therefore arrived to the conclusion that patients in LTC facilities may experience improved mood and sleep quality if offered laughing therapy and physically demanding exercises. In their 2020 investigation, Eshghizadeh et al. [16] wanted to ascertain whether a brief behavioural training programme could enhance sleep quality in older people who had suffered mild sleep interruptions. For the objectives of this study, 64 older people with a Pittsburgh Sleep Quality Index (PSQI) score of less than five had significant sleep interruptions. At random, the participants were split into the intervention (n = 32) and control (n = 32) groups. Older people in the intervention group experienced a brief behaviorally-based sleep training programme that was delivered in a single in-person session followed by four telephone sessions over the course of four weeks, while their counterparts in the control group received no intervention. The study's main conclusion was based on PSQI scores that were compared between the two groups before and after the intervention. The data was analysed using SPSS version 19.0. When compared to individuals in the control group, the PSQI scores of older people receiving intervention fell after 4 weeks ($P 0.001$). Participants in the intervention group also saw statistically significant increases in sleep latency, subjective sleep quality, and efficiency ($P 0.05$). They provided evidence that brief behavioural interventions can help improve senior people's sleep quality without being intrusive and presented evidence that they would be beneficial for seniors who are dealing with minor issues. Van den Ende et al.'s [17] study from 2022 sought to ascertain if the adoption of nonpharmacologic treatments is associated with improved inpatient overnight sleep. Patients were recruited from the medical and surgical wards, acute medical unit of a Dutch university hospital. All patients who spent exactly 1 full night in the hospital between September 1, 2019, and May 31, 2020 were enrolled, and the control group received normal care. Patients who were enrolled between September 1, 2020, and May 31, 2021, were a part of the intervention group. The intervention group received aromatherapy, earplugs, and eye and head protection.

The morning medication and vital sign measurement rounds for the acute medical unit were switched from the night shift to the day shift, and nurses received training on good sleep hygiene. In collaboration with patients, nurses, and medical professionals, each intervention was developed. Sleep quality was assessed using actigraphy and the Dutch-Flemish Patient-Reported Outcomes Measurement Information System sleep disturbance item bank. The use of sleep-enhancing medications and patient reports of sleep-disturbing factors were other outcomes. A total of 374 patients, with a median age of 65, were involved in the trial, with 222 in the control group and 152 in the intervention group. Of them, 331 patients (195 men) were included in the analysis, with the acute medical unit housing the majority (138 control, 127 intervention).

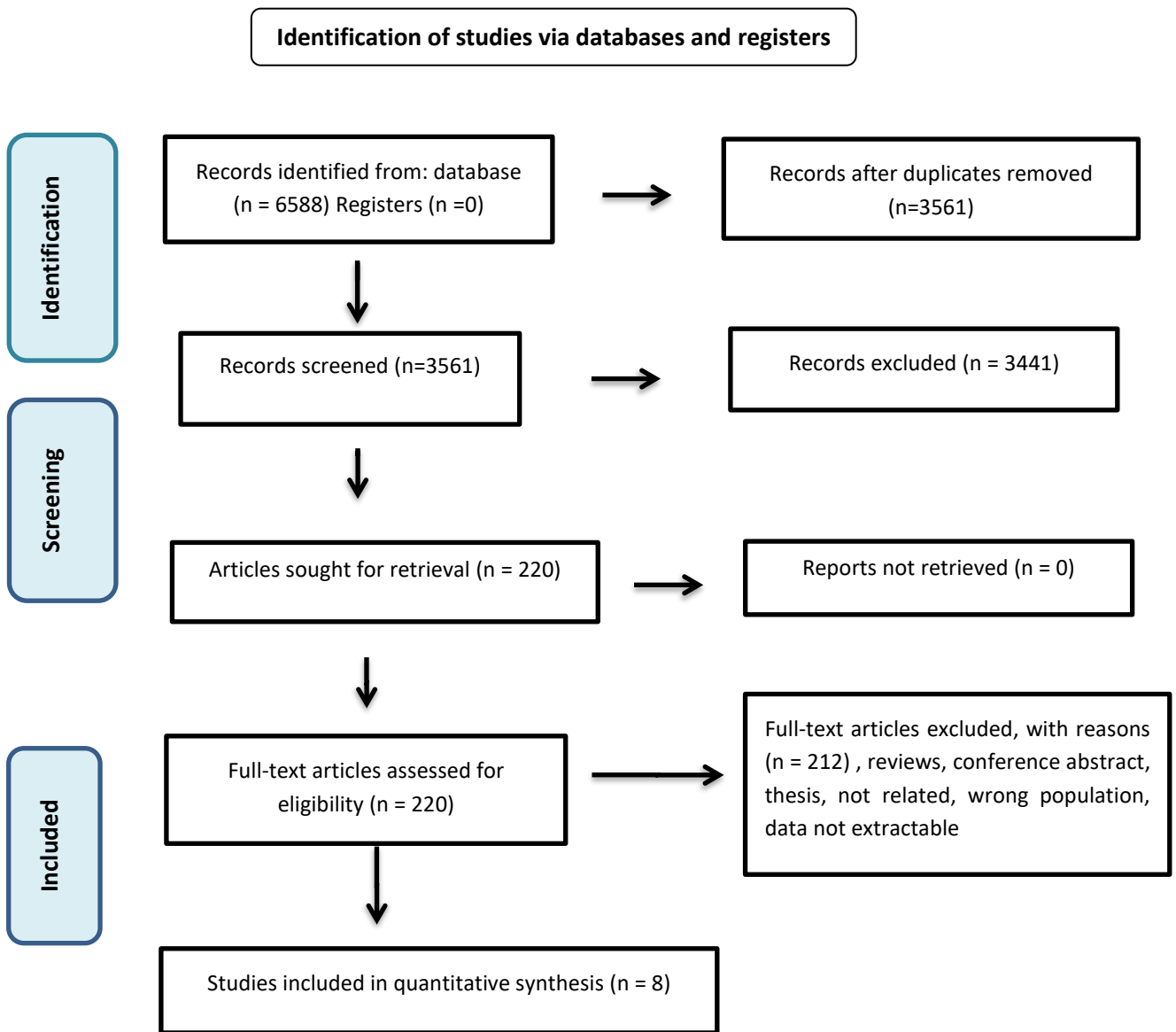


Figure 1: PRISMA flow diagram showing process of studies selection

Table1. Quality assessment of included studies

| Study | Selection | Comparability | Outcome | Overall (max 9) |
|------------------------------------|-----------|---------------|---------|-----------------|
| Wang et al., (2001) [11]. | **** | * | ** | 7, Good |
| Chang et al., (2011)(12) | **** | * | *** | 8, Good |
| Rondanelli et al., (2011) [13]. | *** | * | ** | 6, Good |
| Tom et al., (2016) [10]. | **** | * | *** | 8, Good |
| Abdullahzadeh et al., (2017) [14]. | *** | * | ** | 6, Good |
| Han et al., (2017) [15]. | *** | * | ** | 6, Good |
| Eshghizadeh et al., (2020) [16]. | **** | * | ** | 7, Good |
| van den Ende et al., (2022) [17]. | **** | * | ** | 7, Good |

Table 2: Comparison of the included studies

| Wang et al., (2001) [11]. | Study design | Aim | Participants | Interventions | Outcome |
|------------------------------------|---|---|--|---|---|
| Chang et al., (2011)(12) | Case-control study | To investigate the relationship between medical issues, prescription drugs, and hospitalized elder patients' risk of falling | 1,222 hip fracture patients and 4,888 comparison individuals were age and gender frequency matched (all were at least 65 years old). | Prior to the event of interest, Benzodiazepine use and other covariates were evaluated. | Benzodiazepine use increases the risk of hip fracture and should be avoided. |
| Rondanelli et al., (2011) [13]. | Case-control study | To find out if melatonin, magnesium, and zinc are administered every night to patients with primary insomnia in long-term care facilities residents | Older persons (65 and up) who reported fall events in a large academic hospital to the Taiwan Patient-Safety Reporting System in 2006 (n = 165) | Bivariate and multivariate logistic regressions were used to compare cases and controls and examine the association of medical conditions and medication exposure within 24 hours before falls. | To prevent falls in older patients, the use of Zolpidem, benzodiazepines, narcotics, and antihistamines should be minimized, especially in those with cancer. |
| Tom et al., (2016) [10]. | Double-blind, placebo-controlled clinical trial | To determine if the use of zolpidem, eszopiclone, and zaleplon would result in a higher risk of hip fracture and traumatic brain injury (TBI). | Forty-three individuals with primary insomnia (22 in the supplemented group, 21 in the placebo group) aged 78.33.9 | Participants were given a food supplement or placebo daily for 8 weeks before bedtime. | Administration of melatonin, magnesium, and zinc at bedtime can improve sleep quality and quality of life in long-term care facility residents with primary insomnia. |
| Abdullahzadeh et al., (2017) [14]. | Case-crossover study | To ascertain the impact of Matricaria chamomilla extract on the quality of sleep-in old individuals admitted to Isfahan nursing homes in 2014 | A 5% randomly selected group of Medicare recipients aged 65 and older hospitalized with TBI (n = 15,031) or hip fracture (n = 37,833) between 2007 and 2009. | The use of specific medications was compared during the 30-day period before injury hospitalization and 4 control periods. | Eszopiclone may be a safer alternative to Zolpidem for preventing fall-related injuries. |
| Han et al., (2017) [15]. | quasi-experimental clinical trial | To research how laughing therapy affects patients' sadness and sleep at two long-term care (LTC) facilities | 77 elderly people were hospitalized at nursing homes. | One group received chamomile capsules twice daily for 4 weeks, while the other did not receive any intervention. | Oral chamomile extract has sedative properties and can improve sleep quality in elderly patients in nursing homes. |
| Eshghizadeh et al., (2020) [16]. | A nonequivalent design | To determine if a brief behavioral training program can improve older people's sleep quality who are experiencing moderate sleep disruptions. | 42 people aged 65 and up from two separate long-term care hospitals | Laughter therapy treatment was given to 21 residents in one LTC hospital, while in the other hospital, 21 did not receive any treatment. | Laughter therapy and physical activities can improve depression and sleep quality among patients in LTC hospitals. |
| van den Ende et al., (2022) [17]. | controlled randomized trial | To determine if the use of non-pharmacological therapies results in better inpatient night sleep | 98 possible participants who are 60 or older. | The comparison group received training on behavioral components (including stimulus control and relaxation) and sleep hygiene education. | Brief behavioral interventions are promising and useful for improving sleep quality in older adults. |
| Wang et al., (2001) [11]. | nonrandomized controlled trial | To investigate the relationship between medical issues, prescription drugs, and hospitalized elder patients' risk of falling | Patients who were 18 years of age or older, committed to one of the participating wards and had stayed in the hospital for precisely one night | Sleep-enhancing interventions were implemented simultaneously for patients, clinicians, and the hospital system on three levels. | Non-pharmacologic interventions can significantly improve the sleep of hospitalized patients. |

Due mostly to a 30-minute difference in their last waking times, the intervention group experienced a 40-minute longer median sleep duration than the control group (6 hours and 45 minutes vs. 6 hours and 5 minutes). However, there were no appreciable variations in the groups' levels of sleep. Both groups reported being disturbed by medical workers, pain, toilet excursions and noises that kept them from falling asleep. The most frequently used devices were sleep masks and earplugs, and in comparison, to the control group, the intervention group experienced significantly fewer nocturnal vital sign checks. According to the study's findings, non-pharmacological therapies may greatly enhance patients' ability to sleep while they are in the hospital. In order to accomplish this, it may be necessary to move the morning rounds for vital sign checks and medicine administration from the night shift to the day shift. Due to the dearth of prior research on the subject, our study may have certain limitations.

4. Conclusions

Our review concludes that nonpharmacologic treatments for elderly insomnia patients should be considered as a first-line intervention because there is strong evidence supporting their efficacy across a variety of outcomes, and they are likely to have few or no serious side effects. However, there is not enough data to accurately assess the intervention's benefit to harm ratio. If non-pharmacological treatments are ineffective, brief courses of benzodiazepines or non-benzodiazepines may be added to non-pharmacological therapy to prevent their negative effects. Other options include taking melatonin, magnesium, and zinc every night.

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