Ashdin Publishing
Journal of Drug and Alcohol Research
Vol. 13 (2024), Article ID 236279, 04 pages
DOI: 10.4303/JDAR/236279

Research Article

Effect of Opioid Drug Use on the Level of Stress and Sleep Pattern among Older Adult Patient in Geriatric Centers: A Systematic Review

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Received: 03 January 2024; Manuscript No: JDAR-24-127001; **Editor assigned:** 05 January 2024; PreQC No: JDAR-24-127001 (PQ); **Reviewed:** 19 January 2024; QC No: JDAR-24-127001; **Revised:** 24 January 2024; Manuscript No: JDAR-24-127001 (R); **Published:** 31 January 2024; **DOI:** 10.4303/JDAR/236279

Abstract

Prescription opioids are used to treat moderate and severe pain. The drugs are highly used among older adults in geriatric centers with chronic pain. However, prolonged use of the drugs can lead to dependence and other adverse health effects. This systematic review investigates the effects of opioids on the level of stress and sleep patterns among older adult patients in geriatric centers. The review found that opioids worsen stress levels and adversely impact sleep patterns among older adults. Long-term opioid use is significantly linked with incident and recurrent stress-related disorders. The adverse effect on levels of stress increases with duration of use and increase in dosage. Similarly, opioid use leads to poor-quality sleep and disrupts sleep architecture, such as causing longer stage 2 sleep and shorter stage 3 and 4 sleep.

Keywords: Opioids; Stress levels; Sleep patterns; Older adult patients; Geriatric centers

Introduction

Prescription opioids are mostly used for treating moderate to severe pain. Opioid use poses severe health risks because prolonged use can result in dependence [1]. The drugs are also used for non-medical purposes as they induce effects such as relaxation and can make users feel 'high.' Opioids are safe when taken for a short time. Opioid use among older adults is associated with some risks and adverse effects, such as sedation, constipation, fractures, falls, and cognitive impairment [2]. Understanding the potential effects of opioid use on stress levels and sleep patterns on older adults is critical to enable healthcare providers reduce the effects of the drugs and prevent them from experiencing any adverse health-related events. The understanding would also contribute to addressing the opioid epidemic experiencing globally. This essay evaluates the impact of opioids on the level of stress and sleep patterns among older adult patients in geriatric centers.

Method

Search strategy

The search was conducted on PubMed and CINAHL. The Boolean operands 'AND' and 'OR' were used to combine the search terms. The search terms used were 'effect' OR 'Impact' AND 'opioids' OR 'opioids use' AND 'level of stress' OR 'stress level' AND 'sleep pattern' OR 'sleep' AND 'older adults' OR 'older adult patients' AND 'geriatric centers'. The inclusion criteria was studies conducted between 2007 and 2023 (to use up to date evidence), full-text articles published in English, published in peer-reviewed databases. The search excluded studies focusing on populations other than older adults. However, it included studies whose participants were adults of different ages including older ones. After the initial search, duplicates articles obtained from the 2 databases were eliminated. The remaining articles were screened through reading their titles and abstracts to determine if they met the inclusion criteria. The papers that could not be categorized for meeting the inclusion/exclusion criteria were further assessed by reading the full texts or some parts of the full text. More articles were eliminated for not meeting the requirements. 11 articles were included in the systematic review. The search process and articles eliminated at every stage is presented in the PRISMA flow diagram below (Figure 1).

Data extraction and synthesis

Data was extracted from the included studies and classified into 2 themes, presented in the findings section. The data was extracted from them the findings or results sections of the included studies. Only results relevant to the systematic

review topic were extracted. The synthesis involved comparing and contrasting the results. The synthesis is presented in the findings section below.

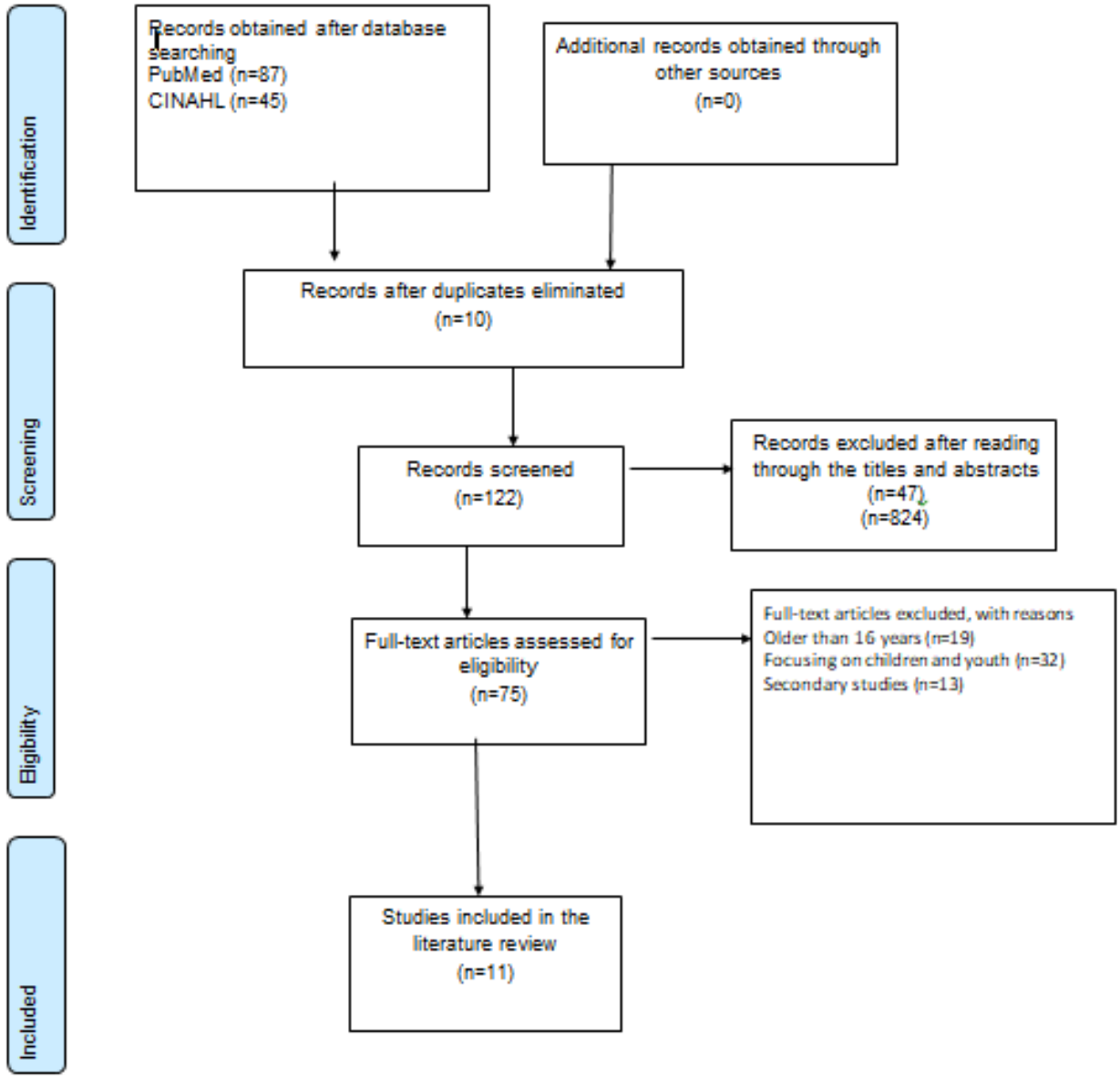

Figure 1: PRISMA flow diagram

Findings

Effect of opioid drug use on the level of stress: Literature indicates that long-term opioid treatment elevates the likelihood of incident, persistent, and treatment-resistant stress and depression [3]. Stress patients are prone to overuse opioids because they utilize them to treat their stress. Stress increases the danger of abuse or non-medical intake of prescription opioids among older adults. This elevated likelihood of non-medical opioid consumption serves as the way through which stress elevates the likelihood of opioid use disorders among older adults with chronic pain. Sullivan (2018) also indicates that though minimizing the severity of chronic pain with opioids contributes to reducing patient distress, opioid treatment of chronic pain does not tend to improve stress levels [3]. The above findings are supported by those of a retrospective cohort research utilizing data from approximately 50,000 veterans taking prescription opioids, which showed that taking opioids for more than ninety days increased the likelihood of the onset of stress and depression compared to taking prescription opioids for less than 90 days [4]. The study concluded that the likelihood of stress onset elevated as the period of opioid exposure increased. However, the study could not determine whether participants were taking opioids as prescribed, combined with unprescribed opioids, or ingested with prescriptions accessed outside the participants' primary care providers. A smaller prospective clinical study revealed that adding the opioid dose from no opioid to 50 mg morphine or more elevated the likelihood of developing stress symptoms [5]. In this study, taking opioids at less than 50 mg was not correlated with stress

symptoms among adults, while adding an opioid dose was linked with increasing stress symptoms. However, this study was limited to a single geographic region, and its findings may not be generalized beyond the study participants. Also, stress was evaluated by self-report using PHQ-2. The instrument is excellent for detecting depression in the past 30 days; it does not measure the longer history of depression. Hence, the study could not establish the dates of stress onset, which could have been long before exposure or after increasing dose.

Another study by Scherrer, et al. (2022) also reported that long-term opioid treatment is correlated with the danger of new-onset stress compared with people who occasionally use opioids [6]. The study also found that the risk for new-onset stress episodes is 40% higher in adults who use opioids near-daily compared to those who use them occasionally. Similarly, in another study by Semenkovich, et al. (2014), the risk of stress was elevated as the dose and duration of consumption increased [7]. This study's participants were 49,770 older adults and veterans who had no history of stress-related disorders. Preliminary analysis indicated that incident of stress-related disorders was associated with any opioid use as compared to individuals who had never taken opioids. After adjusting for confounding variables, initiating opioid consumption remained a major risk factor for stress-related disorders. The risk was elevated with the length of treatment, and depending on the dose, higher doses were correlated with elevated risks. Based on the analyzed literature, extended and high doses of opioid use may lead to the onset of stress-related disorders in older adults in geriatric centers.

Koob, et al. (2010) explain the correlation between opioid use and stress among older adults by indicating that repeated opioid exposures disrupt striatocortial systems that are involved in the correct operating of the prefrontal cortex, which is vital for self-regulation [8]. Interference of these circuits in the amygdala that regulate emotions and stress makes an older adult with extended or addicted to opioid use vulnerable to depression. Semenkovich, et al. (2014) explain that opioid use contributes to incident stress-related disorders due to multiple factors. One such factor is opioid-induced vulnerability to stress [7]. At a system level, opioids regulate several functional brain networks. For instance, the drugs affect the brain by affecting the Hypothalamic-Pituitary-Adrenal (HPA) axis and the hippocampus. The hippocampus regulates the HPA axis by managing cortisol in response to stress. Long-term use of morphine impacts the hippocampus by lowering the density of dendritic spines. This action can impair the hippocampal control of the HPA axis and, ultimately, stress and anxiety.

Effect of opioids use on sleep patterns: Dimsdale, et al. (2007) found that single opioid doses can impact sleep patterns in adults [9]. In this study, opioid drugs significantly minimized deep sleep and increased stage 2 sleep but did not have an effect on sleep efficiency, aggregate sleep time and wake after sleep onset. The drugs lengthened the time taken for light sleep (stage 2) and remarkably reduced the proportion of time in deep sleep (stages 3 and 4). The decrease in deep sleep ranged between 30% and 50%. However, only a few participants were older adults, and generalization of the findings to a more aging population should be taken with caution; the study was limited to pain-free normal individuals, and the study could not establish whether the opioids' effect on sleep persists with long-term use of the drugs. A more recent study report by Rose, et al. (2014) shows that chronic opioid use causes, in addition to disrupting sleep architecture, long-term opioid use causes sleep disturbances, such as increasing sleep-disordered breathing [10]. The 46% of participants in this study who were under opioid treatment had critical sleep-disordered breathing as described by an Apnea-Hypopnea Index (AHI) higher than 30/h. The 71% of participants had clinically significant sleep-disordered breathing (AHI $\geq$ 15). However, the study used a relatively small sample size, and its participants comprised individuals with persistent pain on long-term opioid treatment. Another more recent study by Cao, et al. (2018) also reports that long-term opioid intake is factor that leads to sleep-disordered breathing for people of all age groups [11]. These sleep-related adverse effects lead to daytime impairment, such as daytime hypersomnolence and neurocognitive impairment among adults.

In addition to the above, opioids cause poor-quality sleep in older adults. A survey by Zaidel, et al. (2021) investigating psychosocial issues linked with sleep quality and duration among older patients with persistent pain found that opioid use causes a 30% higher likelihood of poor-quality sleep and roughly 15% higher likelihood of short sleep period [12]. The drugs were not considerably correlated with long sleep duration. However, the study is a cross-sectional design that could not evaluate causation. Also, the study depended on self-reported sleep quality and period, which is less dependable than objective strategies for measuring sleep quality. Due to these limitations, the study findings could not be generalizable to other populations.

Discussion

However, the study used a large sample of older patients with long-term pain and combined several variables to contribute to understanding how opioids impact sleep quality among older adults. Frers, et al. (2022) support the above findings by indicating that opioids adversely affect sleep quality, even months after stopping use [13]. In this study, groups with opioid use history had different sleep quality and duration compared with the group without opioid use history.

Conclusion

Evidence from the cited studies indicates that opioids increase stress levels and adversely affect sleep patterns among older adults. Long-term opioid use is highly linked with incident and recurrent stress-related disorders. The adverse effect on levels of stress increases with duration of use and increase in dosage. Similarly, opioid use leads to poor-quality sleep and disrupts sleep architecture, such as

causing longer stage 2 sleep and shorter stage 3 and 4 sleep.

Acknowledgement

I thank my family for their patience and the great opportunity to devote a lot of time to doing the article in the best possible way.

Authors' Contribution

I'm the primary author and sole author of this article. My contributions to this article is a full contribution.

Funding

None.

Data Availability

All data generated or analysed during this study are included in this published article.

Declarations

Competing interests

The authors declare no competing interests.

Ethics approval and consent to participate

Not applicable for that section. The article is systematic review type.

Consent for publication

Not applicable.

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