

The association of depression and fatigue with sleep disturbances in people living with HIV (PLWH): a systematic review

Hubungan antara Depresi dan Kelelahan dengan Gangguan Tidur pada Orang dengan HIV (ODHIV): Tinjauan Sistematis

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ABSTRACT

Background: HIV remains a global health problem. Sleep disturbances, depression, and fatigue are among the most common problems experienced by people living with HIV. Although these problems frequently occur together, comprehensive research regarding the association between depression and sleep disturbances as well as fatigue and sleep disturbances remains limited.

Objective: This systematic review aimed to investigate the relationship between depression and fatigue and sleep disturbances in people living with HIV.

Methods: A systematic literature review was conducted across four databases PubMed, Scopus, ScientDirect and Sage covering publications from January 2016 to April 2026, following the PRISMA 2020 guidelines. Thirteen eligible studies were reviewed. Methodological quality was evaluated using the JBI Critical Appraisal Tool.

Results: A total of 13 studies were included in this systematic review. Most studies showed that depression was significantly associated with sleep disturbances among people living with HIV (PLWH), including poorer sleep quality, shorter sleep duration, and lower sleep efficiency. Fatigue was also associated with sleep disturbances, particularly insomnia and daytime sleepiness.

Conclusion: Depression and fatigue are important factors associated with sleep disturbances among PLWH. These findings highlight the need for comprehensive assessment and management of sleep and psychological problems in HIV care.

Keywords: depression, fatigue, HIV, sleep disorders

ABSTRAK

Latar Belakang: HIV tetap menjadi masalah kesehatan global. Gangguan tidur, depresi dan kelelahan merupakan masalah yang paling umum yang dirasakan orang dengan HIV. Meskipun masalah itu sering terjadi bersamaan, penelitian komprehensif mengenai depresi dan gangguan maupun fatigue dengan gangguan tidur masih terbatas.

Tujuan: Tinjauan sistematis ini bertujuan untuk menyelidiki hubungan antara depresi dan kelelahan dengan gangguan tidur pada orang dengan HIV.

Metode: Tinjauan literatur sistematis dilakukan pada empat basis data, yaitu, PubMed, Scopus, ScienceDirect dan Sage, yang mencakup publikasi dari Januari 2016 hingga April 2026, dengan mengikuti pedoman PRISMA 2020. Tiga belas studi yang memenuhi syarat. Kualitas metodologis dievaluasi menggunakan alat penilaian kritis JBI.

Hasil: Sebanyak 13 studi dimasukkan dalam systematic review ini. Sebagian besar studi menunjukkan bahwa depresi berhubungan secara signifikan dengan gangguan tidur pada orang yang hidup dengan HIV (ODHIV), termasuk kualitas tidur yang lebih buruk, durasi tidur yang lebih pendek, dan efisiensi tidur yang lebih rendah. Fatigue juga berhubungan dengan gangguan tidur, terutama insomnia dan kantuk di siang hari.

Kesimpulan: Depresi dan fatigue merupakan faktor penting yang berhubungan dengan gangguan tidur pada orang yang hidup dengan HIV (ODHIV). Temuan ini menekankan

perlu nya asesmen dan penatalaksanaan yang komprehensif terhadap masalah tidur dan psikologis dalam perawatan HIV.

Kata kunci: depresi, kelelahan, HIV, gangguan tidur

INTRODUCTION

HIV remains a serious global health problem to this day. According to data from the United Nations Programme on HIV/AIDS (UNAIDS) in 2023, 39,9 million people are living with HIV worldwide. In addition, there were around 1,3 million new HIV infections and 630,000 deaths related to AIDS. The highest burden of HIV is still found in Eastern and South Africa. The Asia Pacific region ranks second, with approximately 6,7 million people living with HIV. Several countries including, Afghanistan, Bangladesh, Fiji, Laos and Philippines, have reported increasing numbers of HIV cases. Indonesia is also among the countries in Southeast Asia with a relatively high burden of HIV, an important public health concern.¹

In Indonesia, the number of people living with HIV in 2024 reached 63,307 cases, while 21,537 cases of AIDS were reported. These figures indicate that HIV/AIDS remains a significant public health issue at the national level.² Antiretroviral therapy (ART) has been established as the primary treatment for HIV. The use of ART has significantly reduced mortality rates and improved life expectancy and prognosis among people living with HIV (PLWH). As a result, HIV is now considered a chronic condition that can be managed over the long term rather than a fatal disease.³

Despite these advances, people living with HIV continue to experience various physical and psychological complications that negatively affect their quality of life. Among these, sleep disturbances, depression, and fatigue are highly prevalent conditions that often occur simultaneously, yet remain underrecognized and inadequately addressed in HIV care.⁴

Sleep disturbances are commonly reported among PLWH, including insomnia, poor sleep quality, disrupted sleep architecture, and excessive daytime sleepiness. Previous studies have reported that the prevalence of sleep disturbances in PLWH ranges from 50% to more than 70%, which is significantly higher than in the general population. The underlying mechanisms are multifactorial and complex, involving neurological involvement, chronic systemic inflammation driven by pro-inflammatory cytokines such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF- α), as well as neuropsychiatric effects associated with certain antiretroviral regimens, particularly efavirenz-based therapy, which can affect sleep architecture.⁵

Depression is one of the most common psychological problems among people living with HIV, with a prevalence estimated to be two to four times higher than in the general population. Major depressive disorder (MDD) affects approximately 20–40% of PLWH globally, although this figure varies depending on region, measurement tools, and participant characteristics. Several studies have shown that depression is significantly associated with sleep disturbances among PLWH, where individuals with higher levels of depression tend to experience poorer sleep quality.⁶

Fatigue is also one of the most common symptoms experienced by PLWH, with a relatively high prevalence. One important component of fatigue is perceived lack of energy, which is frequently reported in this population. A study found that approximately 65% of PLWH experience a lack of energy, which significantly impacts daily functioning. Fatigue does not occur in isolation but is closely associated with other symptoms, including sleep disturbances and depression. These findings suggest that fatigue, sleep disturbances, and depression are interrelated and may form a cyclical pattern. Sleep disturbances can exacerbate fatigue, while persistent fatigue can further impair sleep

quality, ultimately leading to a decline in overall quality of life among people living with HIV.⁷

Although sleep disturbances, depression, and fatigue are common among people living with HIV, most previous studies have examined these variables separately. Findings regarding the relationship between depression, fatigue, and sleep disturbances also remain inconsistent across studies. In addition, most available studies use cross-sectional designs, limiting understanding of the interactions among these symptoms. Therefore, this systematic review aimed to synthesize existing evidence on the relationship between depression and fatigue with sleep disturbances among people living with HIV.

METHODS

Study design

This research using a systematic literature review design to explain the relationship between depression and fatigue with sleep disturbances among people living with HIV (PLWH). The review process used the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA)-2020 guidelines to main methodological transparency and consistency throughout the study. The review process included literature identification, article screening, quality assessment, data extraction, and synthesis of findings.

Search strategy

This literature searched was using four databases: PubMed, Scopus, ScienceDirect and Sage, studies published between 2016 and 2026 were considered in older to ensure that the review reflected the most resent evidence. Keywords were combined using Boolean operators. The search terms included “HIV” OR “people living with HIV” AND “depression” AND “fatigue” AND “sleep disturbance” OR “insomnia” OR “sleep quality”. All retrieved from the databases were exported into reference management software to facilitate organization, duplicate removal, and the screening process.

Eligibility criteria

Studies were considered eligible if met the following criteria: involved study population of adults (aged over 18 years) confirmed to be living with HIV, examined at least one of the variables of interest (depression and sleep disturbance or fatigue and sleep disturbance, used quantitative study designs sus as cross-sectional or cohort and were published in peer reviewed in English between 2016 and 2026. Studies were exclude when they were review articles, conference proceedings, editorials or letters to the editor. Articles without accessible full text ans studies that did not directly address the research objective were also excluded from the review. The researcher used the PEO (Population, Exposure,Outcome), as in the table below:

Table 1. PEO Summary

Component	Information
Population	People living with HIV (PLWH)
Exposure	Depression and fatigue
Outcome	Sleep disturbance

Study selection process

The study selection process was conducted in several stages to ensure the inclusion of relevant studies. Initially, a total of 2,067 records were identified through database searching after applying limitations to studies published within the last 10 years, article document type, and English language publications. After removing 330 duplicate records, 1,737 articles remained for further screening. The title and abstracts of these articles were then reviewed, resulting in the exclusion of 1657 tudies that did not meet the inclusion criteria. The remaining 80 articles were assessed through full-text review.

During the full text evaluation, 67 Articles were excluded for reason such as irrelevance to the study objectives, review design or lack of full-text availability. Finally,13 articles were included in this systematic review.

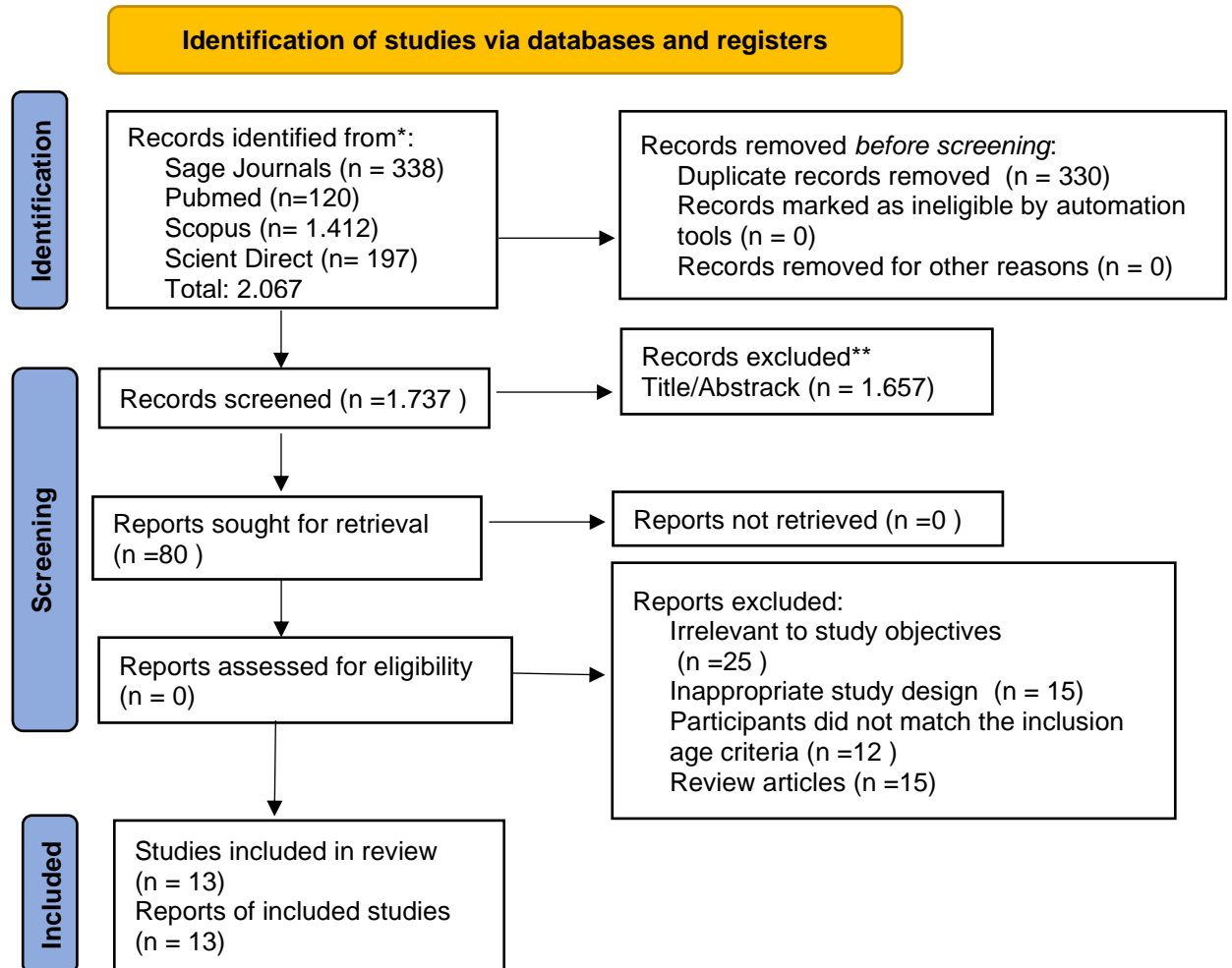


Figure 1. Diagram Flow PRISMA-2020

Data extraction

The data extraction results are attached in a table consisting of the author's name, year of publication, country of study, study design, sample size, measurement instruments and major findings related to depression, fatigue and sleep disturbance.

Using a structured extraction form helped maintain consistency across all included studies and minimized the risk of missing important information.

Quality assessment / Risk of bias

The methodological quality of the included studies was assessed using JBI Critical Appraisal Tools, for observational studies.⁸

Appropriate JBI checklists for cross-sectional and cohort studies were used to evaluate study quality, including measurement validity, management of confounding factors, and statistical analysis. Studies were categorized as having low, moderate, or high risk of bias, and only studies with acceptable methodological quality were included in the final synthesis.

Data synthesis

Data synthesis was conducted by reviewing studies that met the inclusion, exclusion, and quality assessment criteria. Due to heterogeneity among the included studies, particularly in study design, sample size, and measurement instruments, a meta-analysis was not performed. Therefore, the findings were analyzed and presented using a narrative synthesis approach.

RESULT

Literature search

A total of 13 studies met the eligibility criteria and were included in this systematic review. The methodological quality of the included studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist, with most studies demonstrating moderate to high quality. Most studies clearly described the inclusion criteria, study participants, and used valid and reliable measurement instruments. However, several studies had limitations related to confounding factors due to the predominance of cross-sectional designs.

Table 2. Extraction of Included Studies

Author	Country	Objectives	Design	Sampling	Participant	Instruments	Result
Yoo-Jeong M, Ratnayake A, Tong Y, et al. (2024) ⁹	Uganda	correlates of sleep health among older (aged≥50 years) with and without HIV.	Cross-sectional study	Purposive sampling	n=600 PWH=298; PWoH=302	- Pittsburg Sleep Quality Index (PSQI) - Depression subscale of the Hopkins Symptom Checklist	Depression was inversely associated with sleep quality (aOR=0.21), sleep duration (b=-0.44), and sleep efficiency (aOR=0.51).
Ayşe Ö. Mete, et al (2023) ¹⁰	Turkey	To examine the association between obstructive sleep apnea (OSA), depression, and sleep quality among people living with HIV (PLWH).	Prospective cross-sectional study	Convenience sampling	N=179 PWH=99 PWoH = 80	- The Pittsburgh sleep quality scale (PSQI) - Stanford Sleepiness Scale - STOP-BANG questionnaires - Berlin questionnaire - The Beck Depression Inventory (BDI)	People living with HIV showed poorer sleep quality compared with controls, with significantly higher Pittsburgh Sleep Quality Index scores (p=0.031) and greater daytime dysfunction (p=0.004). In addition, moderate/severe depression was more frequently found in the HIV group compared with controls (41.4% vs 22.5%; p=0.007).
Asres, Bedaso,	Ethiopia	to examine the quality	cross-	systematic	N=2533	- The Pittsburgh Sleep	Poor sleep quality among

Author	Country	Objectives	Design	Sampling	Participant	Instruments	Result
et al (2020) ¹¹		of sleep and its associated factors among people living with HIV/AIDS	sectional study	random sampling		Quality Index (PSQI) - The hospital anxiety and depression scale (HADS) - 3 items Oslo social support scale (OSS-3)	people living with HIV was significantly associated with age 55–64 years and >64 years, low monthly income (<1656 ETB), anxiety, depression, and poor social support (p<0.05).
Arezu Nazafi et,al (2021) ¹²	Tehran	to assess sleep disorder, psychiatric characteristics, and employment status among Iranian PLWH.	cross-sectional study	simple random sampling	N = 304	- Pittsburgh Sleep Quality Index (PSQI) - Depression Anxiety Stress Scales (DASS)	72% of people living with HIV experienced poor sleep quality and 56% experienced depression. However, in the multivariable analysis, depression was not found to be significantly associated with poor sleep quality.
Valentina Massaroni, et al (2025) ¹³	southern centrally	to assess sleep quality in people living with HIV (PLWH), and to examine how the sleep sphere interacts with mental health, quality of life and internalized stigma	Cross sectional study	Consecutive sampling	N= 250	- Pittsburgh Sleep Quality Index (PSQI) - Depression, Anxiety and Stress Scale (DASS-21) - Short Form 12 (SF-12) - modified six-item internalized - AIDS-related stigma scale	The study found that people living with HIV who experienced depression tended to have poorer sleep quality. Multivariate analysis showed an increase in PSQI scores of 6.20 among patients with depression.
K.N. Redman, et al (2018) ¹⁴	South African	to analyze the association between subjective sleep quality and CD4+ T lymphocyte counts in HIV patients receiving antiretroviral therapy (ART), while considering depression, daytime	Cross sectional study	Convenience sampling.	N = 139	- Sleep quality (Pittsburgh Sleep Quality Index) - Epworth sleepiness scale - Pain - Depression severity (Beck Depression Inventory)	61% of people living with HIV experienced poor sleep quality (PSQI >5), and 41% had clinical depression. Multivariate analysis showed that depression was significantly associated with poor sleep quality among people living with HIV (p<0.001).

Author	Country	Objectives	Design	Sampling	Participant	Instruments	Result
Shameka L.Cody,et al (2021) ¹⁵	United States	examined sleepiness, and pain. insomnia and depressive symptoms	Cross-sectional study	Convenience sampling	N= 120	<ul style="list-style-type: none"> - Brief pain inventory - Insomnia severity index (ISI). - Center for epidemiological studies depression scale (CES-D) 	There is a significant association between insomnia and depression in PLWH with chronic pain who are not using opioids (r = 0.646; p < 0.001), indicating a strong positive correlation.
Jeydith Gutierrez, et al (2019) ¹⁶	US	To assess sleep disturbances in HIV-infected patients and examine their association with depressive symptoms.	Cross-sectional study	Convenience sampling	N = 176	<ul style="list-style-type: none"> - Pittsburgh Sleep Quality Index (PSQI) - Insomnia Symptoms Questionnaire (ISQ) - Epworth Sleepiness Scale (ESS) - STOP-BANG - Patient Health Questionnaire (PHQ9) - Sleep hygiene questionnaire 	PLWH with depression, sleep disturbances were more common (89%) compared to those without depression (48%), indicating a difference in proportions suggesting an association between the two.
Jeremy E Orr, et al (2024) ¹⁷	San Diego	To examine the association between sleep disturbances (including OSA) and fatigue in people living with HIV.	Cross sectional study	convenience sampling	N = 120	<ul style="list-style-type: none"> - FACIT-F - STOP-BANG questionnaire - Epworth Sleepiness Scale (ESS). 	There is a significant association between fatigue and daytime sleepiness in PLWH, with a negative relationship ($\beta = -0.21$; p < 0.001), indicating that increased daytime sleepiness is associated with changes in fatigue levels.
Dan Xu,et al (2026) ¹⁸	China	To explore the core symptoms and associated factors of fatiguerelated	Cross sectional study	convenience sampling	N= 276	<ul style="list-style-type: none"> - Fatigue Self-Assessment Scale (FSAS) - Pittsburgh Sleep Quality Index (PSQI) 	The prevalence of sleep disturbances among HIV/AIDS patients is 43.32% in males and 45.22% in

Author	Country	Objectives	Design	Sampling	Participant	Instruments	Result
		symptom clusters in people living with HIV/AIDS				<ul style="list-style-type: none"> - International Index of Erectile Function-5 - Female Sexual Function Index (FSFI) - Groningen Frailty Indicator (GFI) 	females. Sleep disturbances are a core symptom within the fatigue symptom cluster and may be influenced by the use of efavirenz (68.1% of users experience sleep disturbances).
Ranveig Langseth., et al (2022) ¹⁹	Norway	To investigate the prevalence and predictors of fatigue among PLHIV in Norway.	Cross sectional study	Consecutive sampling	N = 244	<ul style="list-style-type: none"> - Chalder Fatigue Questionnaire (CFQ) 36-Item - Short Form Health Survey (SF-36) - Hopkins symptom checklist-25 (HSCL-25) - Beck's Depression Inventory, version 2 (BDI-II) - 16-Item Post Traumatic Stress Scale (PTSS-16) - Alcohol Use Disorder Identification Test (AUDIT) - Drug Use Disorder Identification Test (DUDIT) 	People living with HIV (PLWH) who experience sleep disturbances have a 2.67 times higher likelihood of experiencing fatigue compared to those without sleep disturbances.
Hening Pujasari, et al (2021) ²⁰	Indonesia	To determine the effect of sleep disturbances and their related symptoms on quality of life (QoL) among people living with HIV/AIDS (PLWH) receiving antiretroviral therapy (ART)	Cross sectional study	Convenience sample	N = 200	<ul style="list-style-type: none"> - WHOQOL-HIV BREF - Insomnia Severity Index (ISI) - FACIT-Fatigue Scale - Numeric Pain Rating Scale (NPRS) - ART adherence. 	Fatigue had a significant positive correlation with insomnia ($r = 0.577$; $p < 0.01$), indicating that increased sleep disturbances were associated with higher levels of fatigue among people living with HIV/AIDS (PLWH).
SoSon Jong, et	USA	To describe correlates	Baseline	Convenience	N=53	- Memorial Symptom	Sleep quality was associated

Author	Country	Objectives	Design	Sampling	Participant	Instruments	Result
al (2019) ²¹		of fatigue and lack of energy symptoms in adults living with HIV.	observational study within a pilot RCT	sampling		Assessment Scale (MSAS) - International Physical Activity Questionnaire (IPAQ) - Epworth Sleepiness Scale (ESS) - Hospital Anxiety and Depression Scale (HADS) - Pittsburgh Sleep Quality Index (PSQI) - Fatigue Severity Scale (FSS)	with fatigue in people living with HIV/AIDS (PLWHA), with higher mean fatigue scores among respondents with sleep disturbances (M=2.07; SD=0.90).

DISCUSSION

Based on the synthesis of 13 studies included in this systematic review, sleep disturbances were common among people living with HIV (PLWH). Most studies showed that depression and fatigue were significantly associated with poor sleep quality, insomnia, daytime dysfunction, and daytime sleepiness. Several studies also identified factors such as older age, anxiety, poor social support, low socioeconomic status, and antiretroviral therapy use, particularly efavirenz-based therapy, as contributors to sleep disturbances. These findings suggest that sleep disturbances among PLWH are influenced by multiple biological, psychological, and social factors.²² Most studies included in this review reported a significant relationship between depression and sleep disturbance among people living with HIV. Several studies found that depression was associated with poorer sleep quality, shorter sleep duration and lower sleep efficiency. In addition, PLWH with depression tended to have higher Pittsburgh Sleep Quality Index (PSQI) scores than those without depression, indicating worse sleep quality. Other studies also showed that sleep disturbances were more common among PLWH who experienced depression compared to those without depressive symptoms. These findings are consistent with previous research showing that depression and sleep disturbances have a bidirectional relationship in PLWH. Sleep problems may increase the risk of depression, while depression itself can worsen sleep quality and increase insomnia symptoms.²³ The etiology of depression in this context is highly multifactorial, involving psychosocial stressors such as stigma, social isolation, fear of disclosure, and economic difficulties, as well as biological mechanisms including neuroinflammation, dysregulation of the hypothalamic pituitary adrenal (HPA) axis, and the direct neurotoxic effects of HIV on the central nervous system. Depression can significantly decrease participation in HIV care, lead to poor adherence to antiretroviral therapy, and contribute to immunological decline, as reflected by lower CD4+ T-cell counts and increased HIV viral load.²⁴

However, one study reported that depression was not significantly associated with poor sleep quality after multivariable analysis, possibly due to differences in participant characteristics, measurement instruments, and confounding factors. Besides depression, fatigue was also significantly associated with sleep disturbances among people living with HIV (PLWH), including insomnia, poor sleep quality, and daytime sleepiness. The relationship between fatigue and sleep disturbances appears to be bidirectional, where poor sleep quality may lead to persistent fatigue and reduced energy recovery among PLWH.

The pathophysiology of fatigue in people living with HIV is Neuroanatomically, fatigue in people with HIV (PWH) is thought to be modulated by the thalamo-striato-cortical circuitry involving the basal ganglia, a brain region that is highly affected by HIV. Mitochondrial dysfunction in the brain is also believed to contribute to fatigue. Fatigue significantly impairs work performance, social participation, and adherence to treatment, thereby contributing to a worsening clinical course. It also shares overlapping neurobiological substrates with depression and sleep disturbances.²⁵

In addition to depression and fatigue, several other factors were found to be associated with sleep disturbances among PLWH. Studies included in this review identified older age, low income, anxiety, and poor social support as significant factors related to poor sleep quality. Older individuals may experience changes in sleep patterns due to aging processes and disease progression.

Socioeconomic factors may also contribute to sleep problems. Low income can increase psychological stress and limit access to healthcare services, which may worsen both mental health and sleep quality. Furthermore, inadequate social support may increase feelings of loneliness, stigma, and emotional distress, which can contribute to insomnia and other sleep-related problems.

Previous studies have also highlighted the importance of social support, coping style, and stable social rhythms in improving sleep quality among PLWH. Individuals with poor social support tend to experience more severe sleep disturbances and depressive symptoms.²³

The findings of this review suggest that depression, fatigue, and sleep disturbances may form a symptom cluster among PLWH, where these symptoms often occur together and influence one another. Their coexistence may negatively affect quality of life, mental health, physical functioning, and treatment adherence. Therefore, symptom management in PLWH should be holistic. Nurses play an important role in the early identification of sleep disturbances, depression, and fatigue through comprehensive assessment and continuous care.

Non-pharmacological interventions such as sleep hygiene education, psychosocial support, stress management, physical activity, relaxation therapy, and cognitive behavioral therapy may help reduce sleep disturbances among PLWH. In addition, strengthening social support and improving social rhythm stability may contribute to better sleep quality and reduced depressive symptoms.

This systematic review has several limitations. Most included studies used cross-sectional designs, making it difficult to establish causal relationships between depression, fatigue, and sleep disturbances. In addition, variations in measurement instruments for sleep quality, depression, and fatigue may have contributed to heterogeneity across studies. Differences in participant characteristics, sample size, and ART regimens may also have influenced the findings.

CONCLUSION

This systematic review found that depression and fatigue are significantly associated with sleep disturbances among people living with HIV (PLWH). The prevalence of sleep

disorders among people living with HIV ranged from 31.8% to 52.4%. Most included studies showed that PLWH with depressive symptoms and fatigue tended to experience poorer sleep quality, insomnia, daytime dysfunction, and daytime sleepiness. The findings also suggest that depression, fatigue, and sleep disturbances may occur simultaneously as a symptom cluster that negatively affects quality of life, physical functioning, and treatment adherence. Therefore, comprehensive and holistic assessment of sleep quality, psychological condition, and fatigue is important in HIV care.

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