Poor sleep quality and associated factors among people attending anti-retroviral treatment clinic at Finote selam general hospital, Amhara, Ethiopia

Mihret Adane a, Haile Amha b, Yilkal Tafere c, Girma Alem d

a General Public Health in Finote Selam Hospital, Amhara, Ethiopia
b Debre Markos University, College of Health Science, Debre Markos, Ethiopia
c Debre Markos University College of Health Science, Department of Public Health, Debre Markos, Ethiopia
d Debre Markos University College of Health Science, Department of Nursing, Debre Markos, Ethiopia

OBJECTIVE: to assess the prevalence and associated factors of poor sleep quality in adults with Human Immuno Virus Syndrome who attended an Anti-Retro-Viral Treatment clinic at Finote Selam General Hospital in Amhara, Ethiopia, in 2021.

METHODS: A Hospital based cross sectional study was conducted from October 15 to November 2020 and systematic random sampling technique was used to select sample size of 399 study subjects. Sleep Quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). The data was entered to Epi data version 4.2 and analysis was done with SPSS version 25.0 software. Binary logistic regression technique was employed and variables with p-value less than 0.25 in the bi-variable analysis were entered to the multivariable analysis. Odds ratio with 95% Confidence Interval was calculated and statistical significance was declared at P-values < 0.05.

RESULTS: The prevalence of poor quality of sleep among PLWHA was 55.1% [95% CI: 50.1–60.2] 0.12 months duration of HIV diagnosis [AOR = 4.02, 95% CI: (1.604, 10.070)], CD4 count<200 cells/mm3 [AOR = 2.76, 95% CI: (1.189,6.408)]. Viral load >1000 copies [AOR = 3.41, 95% CI: (1.384, 8.417)] and having depression [AOR = 2.06, 95% CI: (1.056, 4.019)] were factors significantly associated with poor sleep quality.

CONCLUSION: In this study, it was discovered that above 50% of people living with HIV/AIDS had poor sleep quality. It is critical to reduce prevalence by developing prevention and intervention strategies that address the identified factors.

© 2022 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

1. Introduction

Sleep quality refers to how long and how well an individual sleeps each night. It also includes how difficult it was for a person to fall asleep, stay asleep, and how many times he or she woke up during the night. Furthermore, it was a feeling of being rested and refreshed after waking up from a deep sleep. A good sleep quality was an indicator of wellbeing, whereas a poor sleep quality leads to increased co-morbidity, mortality, health-care costs, and a poor quality of life in people living with HIV (PLWH) [1,2].

Sleep disorders were common problems that were reported in 10%–40% of the general population. These issues can have an impact on one’s quality of life, physical and social functioning, and even cause chronic fatigue. Sleep disorders were also more prevalent in people living with HIV than in the general population, with prevalence ranging from 30% to 100% depending on the definition and methodology used [3–7].

Alterations in sleep structure were one of the earliest and most consistent physiologic changes reported in people infected with the human immunodeficiency virus (HIV). Despite the fact that sleep disturbances were reported to be common among HIV-positive patients, they were especially/still sensitive to poor sleep quality due to a variety of biological reasons. HIV infection of the central
nervous system (CNS), CNS opportunistic infections, substance abuse, antiretroviral (ARV) side effects, medical co morbidity, and immunological dysfunction are among these causes [8,9].

Most of the body’s systems were in an anabolic condition during sleep, assisting in the restoration of the immune, neurological, skeletal, and muscular systems, all of which are crucial processes in maintaining mood, memory, and cognitive function, as well as other daily functions. PLWHA’s quality of life, cognitive function, and emotion are all affected by sleep problems, which can contribute to poor medication adherence. It can also cause a variety of negative effects in HIV/AIDS patients, including as decreased health-related quality of life, increased daytime sleepiness, and cognitive impairment [10–13].

Poor sleep quality has been linked to disease progression, medication side effects, financial concerns, unemployment, and a lack of knowledge about sleep-enhancing behaviors in the HIV-infected population. It may also result in a weakened immune system, decreased physical performance, impaired cell growth and repair, deteriorated neuronal connections and neuronal malfunctions, and an increase in the risk of cardiovascular morbidity and mortality, as well as the degree of suffering associated with psychiatric disorders [10,14–16].

Poor sleep has been linked to disease progression, medication non-adherence, and unemployment among HIV patients. Individuals whose ARV non-adherence was partly due to sleep problems may benefit from early detection and treatment of sleep disorders, which may improve ARV adherence and reduce non-adherence effects [17–20].

According to the findings, those living with HIV not only had poor sleep quality, but they also had more acute and distressing symptoms. As a result of the sadness associated with HIV, such people were less likely to stick to their antiretroviral drug regimens. Noncompliance can lead to disease progression, the formation of resistant strains, and treatment failure, as well as sleep difficulties that can affect their quality of life and work performance. Determining the quality of sleep and its effects may aid in the prevention of HIV-related problems or the use of antiretroviral therapy (ART) [6,15,21,22].

Even though the prevalence of sleep disorder in PLWHA was high in different countries with a wide range of medical and psychological complications, there was no adequate information on the prevalence and associated factors of sleep quality among adult PLWHA in Ethiopia. As a result, this study attempted to fill these gaps by assessing the prevalence and associated factors of sleep quality in adults receiving ART at Finote Selam Hospital.

2. Methods and materials

2.1. Study area

The study was conducted at Finote Selam General Hospital at ART clinic. Finote selam town was found in west Gojjam zone, Amhara regional state. It was capital city of west Gojjam zone, which was found at 387 Km from Addis Ababa, 176 Km from Bihar Dar. Finote Selam General Hospital is, currently works with 375 staffs from these 235 of them were clinical staffs, and 100 of them were supportive staffs and 40 of them were in different training programmes. The Hospital serves for more than 1.5 to 2.0 million populations in the catchment area. The hospital was built in 1954 as Tuberculosis and leprosy center in west Gojjam. It becomes a hospital since 1972 E C and started ART service since 1998 E C. At the time of study conducted, there were around 1890 clients on ART service.

2.2. Study design and period

The study was conducted from October to November 2020, using an institution-based cross-sectional study design.

2.3. Inclusion and exclusion criteria

All adults aged 18 and up who attended an ART clinic at Finote Selam General Hospital during the data collection period were included in the study, but ART patients who were seriously ill and unable to communicate were excluded.

2.4. Sample size determination

The sample size was calculated using the single population proportion calculation with a 95% confidence interval, a 5% margin of error, and the prevalence of poor sleeping quality among HIV/AIDS patients (p = 55.6%) from a study conducted at Zewditu Memorial Hospital in Addis Ababa, Ethiopia [23]. The required sample size was calculated as follows:

\[ n = \left( \frac{Z}{2} \right)^2 \frac{p(1-p)}{d^2} \]

Using the above formula, the required sample size (n) was calculated as 417 patients.

2.5. Sampling procedures

417 patients were chosen using a systematic sampling technique. The sampling interval was calculated by dividing the total population of the study by the sample size. The total number of ART patients currently enrolled in ART services was 1902. Approximately 880 of them were followed up on during the average 1-month data collection period. This was due to a problem with covid-19 and a model known as appointment spacing. The sampling interval (K) was set at two. The first study participant was chosen by lottery method.

2.6. Data quality assurance

By reviewing the literature on similar studies on sleeping quality, the questionnaire was adapted. The questionnaire was first written in English, then translated into Amharic (local languages), and finally retranslated back into English to ensure consistency. Three data collectors and one data collection supervisor were received one day of training on the study instrument, data collection procedures, and ethical confidentiality principles. Before the actual data collection period, a pretest was conducted on 5% of the sample size (21 study participants) to check the clarity, flow, cultural, and moral fitness of the questionnaires, as well as the time required to fill them in Bure Asrade Memorial Hospital. Each day of the data collection period, the collected data was checked for completeness and consistency.

2.7. Data collection procedures and tools

The questionnaire includes questions about respondents’ sociodemographic characteristics, sleep quality, clinical factors, substance use, anxiety and depression, environmental factors, HIV-related perceived stigma, and social support. The Pittsburgh Sleep Quality Index (PSQI), a 19-item self-rated scale that examined Sleep Quality and disturbances over a 1–month period, was used to assess sleep quality [23]. This tool primarily addresses seven sleep components in the last month: sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The total PSQI score was calculated by adding the seven component scores, yielding a score
Table 1
Socio-demographic characteristics of adults with HIV/AIDS attending ART clinic in Finote Selam General Hospital, Amhara, Ethiopia, 2020. (n = 399).

| Variable                  | Category         | Frequency | Percentage |
|---------------------------|------------------|-----------|------------|
| Age                       | 18–24            | 9         | 2.3        |
|                           | 25–54            | 337       | 84.5       |
|                           | ≥65              | 49        | 12.3       |
| Sex                       | Male             | 139       | 34.8       |
|                           | Female           | 260       | 66.2       |
| Religion                  | Muslim           | 32        | 8          |
|                           | Orthodox         | 358       | 89.7       |
|                           | Protestant       | 9         | 2.3        |
| Marital status            | Single           | 83        | 20.8       |
|                           | Married          | 164       | 41         |
|                           | Divorced         | 118       | 29.6       |
|                           | Widowed          | 34        | 8.5        |
| Ethnicity                 | Amhara           | 383       | 96         |
|                           | Oromo            | 12        | 3          |
|                           | Other            | 4         | 1          |
| Educational status        | Unable to read and write | 125 | 31.3 |
|                           | Primary          | 128       | 32.1       |
|                           | Secondary        | 70        | 17.5       |
|                           | Tertiary and above | 76    | 19         |
| Occupation                | Civil servant    | 63        | 16.3       |
|                           | Merchant         | 103       | 26.1       |
|                           | Farmer           | 32        | 8          |
|                           | Daily labor      | 61        | 15.3       |
|                           | House wife       | 82        | 20.6       |
|                           | Others           | 58        | 14.5       |
| Monthly income            | <1656.00 ETB     | 173       | 43.4       |
|                           | ≥1656.00 ETB     | 226       | 56.6       |

Other job status includes Drivers, Students, NGO, Female Sex worker, carpenter, Retires, Jobless and beggar.

ranging from 0 to 21. A score of more than 5 points indicates poor sleep quality. Anxiety and depression were assessed using the hospital anxiety and depression scale (HADS) [24]. The use of any substance in the previous three months was used to assess current substance use. If a study participant used any substance at least once in his or her lifetime, the substance’s ever use was assessed. The 12 items HIV-related perceived stigma assessment tool was used to assess stigma [26]. Three data collectors conducted face-to-face interviews in the adult ART Out Patient Department over a one-month period. One supervisor was in charge of monitoring the data collection process.

2.8. Data processing and analysis

Data were checked for completeness, consistency and entered using Epi-Data version 4.2. Then data were exported to SPSS version 25.0 for further analysis. Descriptive results were described in terms of tables, graph and texts. Binary logistic regression technique was used and Variables with less than 0.25 p-values in the bivariable analysis were fitted to the multivariable analysis. Odds ratio with 95% CI was calculated and statistical significance was considered at P-values <.05 in the multivariable analysis. Model fitness was checked by using Hosmer and Lemeshow test.

2.9. Ethical consideration

The Ethical Review Committee (ERC) of Debre Markos University College of Health Sciences provided an ethical clearance letter. The purpose of the study was explained to the respondents, and written consent was obtained from each study participant. The respondents’ right to refuse or withdraw from the study was fully respected, and the information provided by each respondent was strictly kept confidential.

3. Results

3.1. Socio-demographic characteristic

A total of 399 people were included in the study, with a 95.7% response rate. Among the respondents, 260 (65.2%) were females, and 358 (89.7%) were followers of the orthodox religion. The respondents’ mean age was 41.58 years with a standard deviation of 10.12 years, 164 (41.1%) were married, and almost all 383 (97%) were Amhara by ethnicity. Nearly 128 (32.1%) of respondents had a primary education, and 103 (25.8%) worked as merchants. Two hundred twenty-six (226) (56.5%) of those polled had a monthly income of more than 1656 Ethiopian Birr (ETB). (Table 1).

3.2. Clinical characteristics of the respondents

Among 399 respondents, 230 (57.6%) were in WHO clinical stage I, 315 (78.9%) had more than 12 months of HIV diagnosis, 305 (76.4%) had a CD4 count of more than 200 cells/mm3, 359 (90%) were on first line ART drugs, 60 (15%) had chronic medical illness, 260 (65.2%) had an appointment spacing system, and 355 (89%) had no opportunistic infection (Table 2).

3.3. Psycho-social characteristics of the participants

According to the Hospital Anxiety and Depression Scale, 107 (26%) of the respondents reported anxiety, and 148 (37.1%) had depression. (Fig. 1).

Poor social support and strong were found in 177 (44.4%) and 75 (18.8%) of the total respondents, respectively. (Fig. 2). Stigma had experienced by 181 (45.4%) of the participants.

Table 2
HIV related clinic characteristic of adults with HIV/AIDS attending ART clinic in Finote Selam General Hospital, Amhara, Ethiopia, 2020 (n = 399).

| Variable               | Category         | Frequency | Percentage |
|------------------------|------------------|-----------|------------|
| WHO clinical Stage     | Stage I          | 230       | 57.6       |
|                        | Stage II         | 94        | 23.6       |
|                        | Stage III        | 70        | 17.5       |
|                        | Stage IV         | 5         | 1.3        |
| duration since HIV diagnosis | <12 months | 84 | 21.1        |
|                        | >12 months       | 315       | 78.9       |
| CD4 Count              | <200 counts      | 94        | 23.6       |
|                        | >200 counts      | 305       | 76.4       |
| ART regimen type       | first line regimen | 359   | 90         |
|                        | Second line regimen | 40    | 10         |
| Chronic medical illness| Yes              | 60        | 15.0       |
|                        | No               | 339       | 85.0       |
| Types of chronic medical conditions | Hypertension | 13 | 21.7 |
|                        | Diabetes mellitus | 10 | 16.7 |
|                        | Cardiac          | 7         | 11.7       |
|                        | Tuberculosis     | 10        | 16.7       |
|                        | Asthma           | 16        | 26.7       |
|                        | Cancer           | 4         | 6.7        |
| Appointment spacing    | Yes              | 260       | 65.2       |
|                        | No               | 139       | 34.8       |
| Viral load count       | ≥1000            | 64        | 16.0       |
|                        | <1000            | 335       | 84.0       |
| Drug adherence         | Good             | 355       | 89.0       |
|                        | Fair/not good    | 44        | 11.0       |
| Body Mass Index        | Normal           | 298       | 74.4       |
|                        | Over nourished   | 67        | 16.8       |
|                        | Under nourished  | 34        | 8.5        |
| Presence of Opportunistic Infection | Yes | 82 | 20.6 |
|                        | No               | 317       | 79.4       |
3.4. Behavioral/substance usage characteristics of respondents

Among 399 study participants, 112 (28.1%) were current alcoholic users and 30 (7.5%) were current Khat chewers (Fig. 3).

3.5. Prevalence of poor sleep quality

The prevalence of poor sleep quality among PLWHA was 55.1% [95% CI: 50.1–60.2]. The overall sleep quality mean score was 6.13 with Standard deviation of ±2.81. (Table 3).

Fig. 1. Anxiety and depression among adults with HIV/AIDS attending ART clinic in Finote Selam General Hospital, Amhara, Ethiopia, 2020. (n = 399).

Fig. 2. Social support among adults with HIV/AIDS attending ART clinic in Finote General Selam Hospital, Amhara, Ethiopia, 2020. (n = 399).

Fig. 3. Types of substances used by study participants among adults with HIV/AIDS attending ART clinic in Finote Selam General Hospital, Amhara, Ethiopia, 2020. (n = 399).
3.6. Factors associated with poor sleep quality

In bivariable analysis, factors such as sex, monthly income, WHO clinical staging, duration since HIV/AIDS diagnosis, CD4 count, chronic medical illness, appointment spacing, viral load, opportunistic infection, current alcohol, anxiety, depression, and stigma had P values less than 0.25. In a multivariable analysis, variables such as HIV diagnosis duration, CD4 count, viral load, and depression were significantly associated with poor sleep quality with a P-value less than 0.05 (Table 4).

The odds of having poor sleep quality among Participants with <12 months duration of HIV diagnosis were 4.02 times higher as compared to those who had >12 months duration of diagnosis was [AOR = 4.02,95% CI: (1.604, 10.070)].

The odds of poor sleep quality among participants with CD4 count less than 200 was 2.76 higher than those with greater than 200 CD4 count [AOR = 2.76,95% CI: (1.189,6.408)].

Respondents with viral load >1000 were 3.41times more likely to have poor sleep quality as compared to those who have <1000 viral load [AOR = 3.41, 95% CI: (1.384, 8.417)].

The odds of developing poor sleep quality among depressed participants were 2.06 higher than those without depression [AOR = 2.06, 95% CI: (1.056, 4.019)].

4. Discussion

4.1. Prevalence of poor sleep quality

The prevalence of poor sleep quality in PLWHA was 55.1% [95% CI: 50.1, 60.2] in this study. This study's findings were consistent with those of previous studies conducted in Mexico (58.6%) [27], Nigeria at Lagos State University Teaching Hospital (59.31%) [28], and Ethiopia at Zewditu Memorial Hospital (55.6%) [23],Metu hospital (57.1%) [29] and Hawassa Hospital (57.6%) [30].

On the contrary, the prevalence of this study was lower than that of previous studies in the United States, California (68%) [22] and Jimma Town (65.4%) [31]. This variation could be due to a variety of factors, such as different socioeconomic demands and cultural habits among different population groups, as well as the study setting or groups (since in Jimma the study was only conducted on urban populations); because research shows that rural residents are more likely than urban residents to report good levels of sleep quality due to factors such as sleep habits, lifestyle, and stress. This discrepancy might be also due to small sample size, sampling technique and procedure (racial/ethnic minorites) inclusion and exclusion criteria's they used (in the USA study Participation are selected conveniently and bias may occur possibly, as patient with sleep problems may have been more likely to volunteer for the study).

This result was also higher than in studies conducted in Spain (38.2%) [32], China (43.1%) [33], France (47%) [34], Brazil (46%) [35],

| Table 3 | Distribution of the Pittsburgh Sleep Quality Index components among adults on HAART in Finote Selam General hospital Amhara, Ethiopia, 2021 (n – 399). |
|------------------|------------------|------------------|
| Components       | Mean with S. D   |
| C-1 Subjective sleep quality | 0.91 ± 0.68      |
| C-2 Sleep latency  | 1.82 ± 0.91      |
| C-3 Sleep duration  | 0.90 ± 0.97      |
| C-4 Habitual sleep efficiency | 1.10 ± 0.99      |
| C-5 Sleep disturbance | 0.84 ± 0.46      |
| C-6 Using sleep medication | 0.03 ± 0.20      |
| C-7 Day time dysfunction | 0.52 ± 0.52      |
| Over PSQI score   | 6.13 ± 2.81      |

| Table 4 | Factors associated with poor sleep quality among people living with HIV/AIDS at Finote Selam Hospital, Amhara, Ethiopia, 2021 (n – 399). |
|------------------|------------------|------------------|
| Characteristics       | Variables | Sleep quality | COR (95% CI) | AOR (95% CI) |
|------------------|------------------|------------------|------------------|------------------|
| Sex               | Male             | 68              | 71              | 1               | 1               |
|                   | Female           | 111             | 149             | 1.29 (0.851,944) | 1.57(0.962,58)  |
| WHO Staging        | Stage I         | 104             | 126             | 1               | 1               |
|                   | Stage II        | 49              | 45              | 0.76(0.47,123)  | 0.53 (0.290,95) |
|                   | Stage III       | 24              | 36              | 1.58 (0.912,77) | 1.08 (0.492,08) |
|                   | Stage IV        | 2               | 3               | 1.24(0.20756)   | 0.44 (0.063,51) |
| Duration Of HIV Diagnosis | <12 months | 75              | 9               | 9.77(4.7,20.19) | 4.02 (1.60,10.07) ** |
|                   | >12 months      | 170             | 145             | 1               | 1               |
| CD4 Count          | <200 CD4        | 13              | 81              | 7.44(3.97,13.94) | 2.76 (1.19,6.41) * |
|                   | >200 CD4        | 166             | 139             | 1               | 1               |
| Chronic Medical Illness | Yes          | 17              | 43              | 2.32(1.27,422)  | 2.16 (0.185,73) |
|                   | No              | 162             | 177             | 1               | 1               |
| Appointment Spacing | Yes             | 126             | 134             | 0.65(0.43,0.99) | 0.82(0.49,136)  |
|                   | No              | 53              | 86              | 1               | 1               |
| Viral Load Count   | <1000           | 8               | 56              | 7.30(3.38,15.78) | 3.41(1.38,8.42) * |
|                   | ≥1000           | 171             | 164             | 1               | 1               |
| Stigma            | No              | 109             | 109             | 1               | 1               |
|                   | Has stigma      | 70              | 111             | 1.59(1.06,237)  | 0.88 (0.53,148) |
| Opportunistic Infection | Yes        | 30              | 52              | 1.54 (0.93,254) | 0.61 (0.26,138) |
|                   | No              | 149             | 168             | 1               | 1               |
| Current Alcohol Use | Yes             | 44              | 68              | 1               | 1               |
|                   | No              | 135             | 152             | 1.37(0.88,214)  | 1.45 (0.87,242) |
| Depression         | No depression   | 134             | 117             | 1               | 1               |
|                   | Has depression  | 45              | 103             | 2.62 (1.71,403) | 2.06(1.06,4.02) * |
| Anxiety            | No anxiety      | 142             | 150             | 1               | 1               |
|                   | Has anxiety     | 37              | 70              | 1.79 (1.13,284) | 0.725 (0.35,151) |
| Monthly Income     | <1656           | 34              | 109             | 1               | 1               |
|                   | ≥1656           | 115             | 111             | 1               | 1               |

N.B *Indicate P-value <0.05 and ** indicate P-value <0.005. Hosmer and Lemeshow Test had P-value of 0.79.
Irran (47.5%) [36], and Nigeria (46.2%) [37]. The difference in these results could be due to a variety of factors. In China, for example, it could be in socio-cultural characteristics, sampling size, exclusion criteria (pregnant women were not included), and population (most of the respondents were males, married and employed and educated).

In France, the disparity may be due to the fact that study participants were French natives, with more than half of the respondents being male and actively employed. This finding was also higher than in previous studies conducted in Nigeria, where cases of hard drug and alcohol use, depression, and suicidal ideation were excluded from the study, and the majority of respondents were married.

4.2. Factors associated with poor sleep quality

According to this study, patients with a 12-month HIV diagnosis was 4.02 times more likely to have poor sleep quality than those with a longer diagnosis [AOR = 4.02, 95% CI: (1.604, 10.070)]. This could be because this session occurred during a period of highly stigmatized illness and dejection, as well as a loss of self-esteem and the development of all symptoms of depression and normal emotional responses to the reality of living with HIV. These factors may contribute to a higher rate of sleep disturbances in the months following HIV diagnosis. This is also the time when ART drugs are started, which results in ART side effects that can lead to psychological problems. ART side effects undoubtedly increase patients’ concerns about their health, resulting in secondary harm to the patient. This finding was supported by research done in Nigeria [28] and Ethiopia, Zewditu Memorial Hospital [23].

In the current study, participants with a CD4 count of 200 cells/L were 2.76 times more likely to develop poor sleep quality than those with a CD4 count greater than 200 cells/[L[AOR = 2.76, 95% CI: (1.189, 6.408)]. The reason for this could be that HIV patients’ immune systems were directly linked to the mind via a complex network of nerves, hormones, and neuropeptides. As a result, a network of specific physiological pathways enables immune function to have a direct effect on health, such as immune reconstitution inflammatory syndrome (IRIS) in RVI patients and the development of concurrent opportunistic diseases, which exemplifies psychological morbidity and alters sleep pattern. The finding of this study coincides with a study done in Latin America countries [27,28,32,33], Nigeria [37] and Ethiopia, Zewditu Memorial Hospital [23].

Similarly, this study discovered that viral loads ≥1000 copies/ml were a significant factor in developing poor sleep quality among people with HIV/AIDS, with those with <1000 viral loads being 3.41 times more likely to have poor sleep quality [AOR = 3.41, 95% CI: (1.384, 8.417)]. This could be because an increase in viral load in peripheral circulation has been linked to disease progression to the chronic stage, which changes sleep patterns by causing more arousal and waking during sleep periods. A high copy viral load may result in viral treatment failure, whether due to virologic failure, discontinuation of HAART, or loss to follow-up, which increases morbidity and mortality and impairs sleep. This result was consistent with the findings of studies in California [22] and Ethiopia, Dessie [38].

Being depressed was 2.06 times more likely to cause poor sleep quality in people with HIV/AIDS than being non-depressed [AOR = 2.06, 95% CI: (1.056, 4.019)]. This could be because depressed people have lower levels of serotonin neurotransmitters, which leads to a decrease in cognitive performance, which affects normal sleep patterns. Depression was found to have a directional relationship with sleep disturbances; this is because in depression, the sleep-dependent component of sleep regulation is deficient and does not rise to its normal level. As a result, the amount of slow-wave sleep is reduced, and the sleep period is also shortened. This finding was supported by studies conducted in the China [33] France [34], and Ethiopia [30,31]. Unlike previous Ethiopian studies, clinically significant factors such as social support, age, current khat chewing, and obesity are not associated with this finding. This might be due to in socio cultural and population differences.

4.3. Limitation of the study

Some of the reports were based on prior events, which can lead to recall bias. Variables such as alcohol use, khat chewing, and other substances are sensitive issues that may lead to social desirability bias, therefore their use (alcohol, cigarettes, and khat) was not quantified. Because of the cross-sectional study design, this study was unable to establish cause and effect correlations.

5. Conclusion

The results of this study indicate that sleep disturbances are quite common in people living with HIV. More than half of people living with HIV/AIDS were found to have poor sleep quality in this study. Factors such as; CD4 count <200 cells/µL, viral load ≥1000 copies/ml, short duration of HIV diagnosis, being female and having depression were significantly associated with poor sleep quality. According to the findings of the study, clinicians better to conduct routine screenings for mental health problems such as depression, which leads to poor sleep quality. Clinical service providers better to screen sleep pattern of ART clients and give daily basis health education on prevention and management of sleep pattern problems and have to focus on integration of mental health service with HIV/AIDS program at ART clinic.

Consent for publication

Not applicable.

Availability of data and materials

All the data included in the manuscript can be accessed from the corresponding author with an email address haileleul19@gmail.com.

Funding

There were no grants obtained for the study, which were used mostly for the study’s design, analysis, and interpretation of data, as well as the preparation of the report.

CRediT authorship contribution statement

Mihret Adane: Conceptualization, Software, Formal analysis, Investigation, Data curation, Writing — original draft, Writing — review & editing. Haile Amha: Methodology, Formal analysis, Resources, Visualization, Writing — original draft, Writing — review & editing. Yilkal Tafere: Validation, Writing — review & editing, Supervision. Girma Alem: Validation, Supervision, Project administration.

Declaration of competing interest

The authors declare that they have no competing interests.
Acknowledgment

The authors thank the data collectors, supervisor, and study participants for volunteering their time to be a part of the study, as well as Finote Selm General Hospital for their cooperation.

List of abbreviations

ART  Anti Retroviral Therapy  
CNS  Central Nervous System  
CSA  Central Statistical Agency  
HARS  Hamilton Anxiety Rating Scale and somatization  
HDDS  Hamilton Depression Rating Scale  
HART  Hospital Anxiety Rating Scale  
HIV/AIDS  Acquired Immune Deficiency Syndrome  
PLWHA  People Living With HIV/AIDS  
PSQA  Pittsburgh Sleep Quality Index, RVI-Retro Viral Infection

References

[1] Barnes CM, Drake CL. Prioritizing sleep health: public health policy recommendations. Perspect Psychol Sci 2015;10(6):733–7.
[2] Garbarino S, Lantéri P, Durando P, Magnavita N, Sannita WG. Co-morbidity, mortality, quality of life and the healthcare/welfare/social costs of disordered sleep: a rapid review. Int J Environ Res Publ Health 2016;13(8):831.
[3] Crum-Cianflone NF, Roediger MP, Moore DJ, Hale B, Weintraob A, Ganasan A, et al. Prevalence and factors associated with sleep disturbances among early-treated HIV-infected persons. Clin Infect Dis 2012;54(10):1485–94.
[4] Gradisar M, Wolfson AR, Harvey AG, Hale L, Rosenberg R, Czeisler CA. The sleep and technology use of Americans: findings from the National Sleep Foundation’s 2011 Sleep in America poll. J Clin Sleep Med 2013;9(12):1291–9.
[5] Lee KA, Gay C, Portillo CJ, Coggins T, Davis H, Pullinger CR, et al. Types of sleep problems in adults living with HIV/AIDS. J Clin Sleep Med 2012;8(1):67–75.
[6] Reid S, Dywer J. Insomnia in HIV infection: a systematic review of prevalence, correlates, and management. Psychosom Med 2005;67(2):260–9.
[7] Rodríguez Estrada E, Iglesias Chiesa MC, Fresán-Orellana A, Reyes-Terán G. Factors associated with poor sleep quality among HIV-positive individuals in Mexico City. Salud Ment 2018;41(3):123–9.
[8] Norman SE, Resnick L, Cohn MA, Duara R, Herbst J, Berger JR. Sleep disturbances in HIV infection: a systematic review of prevalence, correlates, and management. Psychosom Med 2005;67(2):260–9.
[9] Rodríguez Estrada E, Iglesias-Chiesa MC, Fresán-Orellana A, Reyes-Terán G. Factors associated with poor sleep quality among HIV-positive individuals in Mexico City. Salud Ment 2018;41(3):123–9.
[10] Norman SE, Resnick L, Cohn MA, Duara R, Herbst J, Berger JR. Sleep disturbances in HIV-seropositive patients. JAMA 1988;260(7):922.
[11] Rubinstein ML, Selwyn PA. High prevalence of insomnia in an outpatient population with HIV infection. J Acquir Immune Defic Syndr Hum Retrovirol 1998;19:260–5.
[12] Bernard C, Dalis F, de Rekenere N. Prevalence and factors associated with depression in people living with HIV in sub-Saharan Africa: a systematic review and meta-analysis. PLoS One 2017;12(8):e0181960.
[13] Hindman R, Beck JS. A clinical handbook of psychological disorders: a step-by-step treatment manual, Fifth Edition. LWW 2015;21(4):217–8. https://doi.org/10.1097/PRA.0000000000000087.
[14] Phillips B, Gelula R. Sleep-wake cycle: its physiology and impact on health. Natl Sleep. Found. 2006:1–9.
[15] Tedaldi EM, Minniti NL, Fischer T. HIV-associated neurocognitive disorders: the relationship of HIV infection with physical and social comorbidities. BioMed Res Int 2015;2015.
[16] Camaldo CE, Camaldo A, Creighton J, Salas RE, Selnes OA, David PM, et al. Sleep and cognition in an HIV+ cohort: a multi-method approach. J Acquir Immune Defic Syndr 2013;63(5).
[17] Irwin MR, Olmstead R, Carroll JE. Sleep disturbance, sleep duration, and inflammation: a systematic review and meta-analysis of cohort studies and experimental sleep deprivation. Biol Psychiatry 2016;80(1):40–52.
[18] Qaseem A, Kansagara D, Forcea MA, Cooke M, Denberg TD. Management of chronic insomnia disorder in adults: a clinical practice guideline from the American College of Physicians. Ann Intern Med 2016;165(2):125–33.
[19] Dreher HM. The effect of caffeine reduction on sleep quality and well-being in persons with HIV. J Psychosom Res 2003;54(3):191–8.
[20] Grant RM, Hecht FM, Warrender M, Liu L, Liegler T, Petropoulos CJ, et al. Time trends in primary HIV-1 drug resistance among recently infected persons. JAMA 2002;288(2):181–8.
[21] Little SJ, Holte S, Daar ES, Markowitz M, Collier AC, et al. Antiretroviral-drug resistance among patients recently infected with HIV. N Engl J Med 2002;347(6):385–94.
[22] Núñez M, de Requena DG, Gallego L, Jiménez-Nácher I, González-Lahoz J, Soriano V. Higher efavirenz plasma levels correlate with development of insomnia. J Acquir Immune Defic Syndr. 2001;28(4):390.
[23] Hudson A, Kirksey K, Holzemer W. The influence of symptoms on quality of life among HIV-infected women. West J Nurs Res 2004;26(1):9–23.
[24] Saberi P, Neelands TB, Johnson MO. Quality of sleep: associations with antiretroviral nonadherence. AIDS Patient Care STDS 2011;25(9):517–24.
[25] Mengistu N, Azale T, Yimer S, Melaku E, Shumye S. Quality of sleep and associated factors among people living with HIV/AIDS on follow up at Ethiopian Zewditu memorial hospital. Sci. Sleep. Pract. 2021;5(1):1–8.
[26] Reda AA. Reliability and validity of the Ethiopian version of the hospital anxiety and depression scale (HADS) in HIV infected patients. PLoS One 2011;6(1):e16049.
[27] Lin N, Ensel WM, Simeone RS, Kuo W. Social support, stressful life events, and illness: a model and an empirical test. J Health Soc Behav 1979:108–19.
[28] Visser MJ, Kershaw T, Makin JD, Forsyth BW. Development of parallel scales to measure HIV-related stigma. AIDS Behav 2008;12(5):759–71.
[29] Rodríguez-Estrada E, Iglesias-Chiesa MC, Fresán-Orellana A, Reyes-Terán G. Factors associated with poor sleep quality among HIV-positive individuals in Mexico City. Salud Ment 2018;41(3):123–9.
[30] Oshinaike O, Akinbami A, Ojelabi O, Dada A, Dosunmu A, John Olabode S. Quality of sleep in an HIV population on antiretroviral therapy at an urban tertiary centre in Lagos, Nigeria. Neurol. Res. Int. 2014;2014.
[31] Abdú Z, Dule A. Poor quality of sleep among HIV-positive persons in Ethiopia. HIV/AIDS (Auckland, NZ) 2020;12:621.
[32] Bedaso A, Abraham Y, Temesgen A, Mekonnen N. Quality of sleep and associated factors among people living with HIV/AIDS attending ART clinic at Hawassa University comprehensive specialized Hospital, Hawassa, SNNPNR, Ethiopia. PLoS One 2020;15(6):e0233849.
[33] Berhanu H, Mossie A, Tadesse S, Geleta D. Prevalence and associated factors of sleep quality among adults in Jimma Town, Southwest Ethiopia: a community-based cross-sectional study. Sleep Disord. 2018;2018.
[34] Rogers BG, Lee JS, Baintner SA, Bedoya CA, Pinkston M, Saffron SA. A multilevel examination of sleep, depression, and quality of life in people living with HIV/AIDS. J. Health Psychol 2020;25(10–11):1556–66.
[35] Huang X, Li H, Meyers K, Xia W, Meng Z, Li C, et al. Burden of sleep disturbances and associated risk factors: a cross-sectional survey among HIV-infected persons on antiretroviral therapy across China. Sci Rep 2017;7(1):1–8.
[36] Allavena C, Guimard T, Billaud E, De La Tullaye S, Reliquet V, Pineau S, et al. Prevalence and risk factors of sleep disturbance in a large HIV-infected adult population. AIDS Behav 2016;20(2):339–44.
[37] Aguilar GPs, Dussán-Sarria JA, Souza Ad. Sleep alterations in patients with the human immunodeficiency virus and chronic pain. Br J Psych 2019;2:123–31.
[38] Dabaghzadeh F, Khalili H, Ghaffari P, Alimadadi A. Sleep quality and its correlates in HIV positive patients who are candidates for initiation of antiretroviral therapy. Iran J Psychiatry 2013;8(4):160.
[39] Bisong E. Predictors of sleep disorders among HIV out-patients in a tertiary hospital. Recent Adv Biol Med. 2017;2017:3:2747.
[40] Degu F, Birhanu Y, Azagwe A. Sleep disturbance and associated factors among adult people living with HIV/AIDS at Dessie referral hospital antiretroviral therapy clinic. Northeast, Ethiopia 2020. https://doi.org/10.21203/rs.3.rs-24038/v1.

M. Adane, H. Amha, Y. Tafere et al.  
Sleep Medicine: X 4 (2022) 100054