Sleep Quality Status and its Associated Factorsamong People having follow up Treatment in Jimma University Medical Center ART Clinic, Ethiopia

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Abstract

Background: poor sleep quality is a significant problem in persons living with Human Immunodeficiency Virus (PLWHIV) and is experienced by as much as 73% of this population besides harming the patients' quality of life, it is one of the most disturbing problems. The study aimed to assess the sleep quality status and determinants among people living with human immunodeficiency virus (PLWHIV).

Methods: Institution-based cross-sectional study design was conducted from June 1-30, 2018 at Jimma University Specialized Hospital antiretroviral therapy follow-up clinic among 410 participants. Data was collected by using Pittsburg sleep quality scale. Participants were selected using systematic sampling techniques. Bi-variate and multi-variable logistic regression procedures at 95% confidence interval were used. Statistical significance was declared at the p-value of <0.05.

Results: The finding of this study showed that the overall prevalence of poor sleep quality (PSQI>5) among the HIV positive patients was59% (95%CI=54.4-63.7). In addition, a multivariable logistic regression analysis indicated that being widowed [AOR= 2.85, 95%CI (1.11,7.32)],housewife[AOR=2.31,95%CI (1.01,5.28)],and other(student and retire)[AOR=3.26,95%CI(1.07,9.90)],currentCD4countcategoryof<200CD4+cellcount,cells/mm^3 [AOR=2.48,95%CI(1.33,4.62)],viral load category50>copies/mL[AOR=1.91, 95% CI (1.12, 3.25)]and depression [AOR=6.55, 95% CI (3.91, 10.97)]were identified risk factors of poor sleep quality.

Conclusion: More than half of HIV-infected persons have poor sleep quality and marital status, current CD4 count, viral load, and depression were associated with quality of sleep. So improving the CD4 count with good drug adherence and having a routine screening for depression and treating it accordingly can improve sleep quality of HIV patient.

Key word: sleep quality, HIV/AIDS, JUMC

Background

Sleep is one of the most significant human behaviors, occupying roughly one-third of human life. It is a universal behavior that has been demonstrated in every animal species studied, from insects to mammals. Sleep is a process the brain requires for proper functioning(1).

Sleep quality is a measure of the feeling that a person would have of being energetic, active, and ready for a new day and it includes quantitative aspects such as sleep duration, sleep latency, and number of arousals, as well as qualitative aspects such as the depth and feeling of restfulness upon awakening(2).Sleep problems have also been associated with reduced quality of life. For example, individuals with insomnia are more likely to have interfering daytime symptoms that can have significant repercussions in various areas of functioning including work, social, and family life(3).

On the other hand, a physiologic association between HIV infection and sleep disturbance is realistic and HIV infection can lead to immune dysregulation in the brain that may alter the production of sleep-inducing cytokinesand the relationship between sleep disturbance and markers of HIV severity (CD41 T cell count and HIV-RNA) (4).Sleep difficulties in HIV+ people who have experienced symptoms of their illness such as an opportunistic infection if the immune system was seriously compromised before beginning treatment may be caused by underlying conditions associated with HIV infection, such as fever, pain, dehydration, and poor nutrition(5).

The patho-physiology of sleep disturbances among HIV-infected patients is still largely unknown, but previous studies have suggested possible clues, including the ability of HIV to infect the central nervous system(CNS), impact of antiretroviral medications, CNS opportunistic infections, mental health issues, and substance abuse(6).

In the United States, an estimated 50 million people States have poor sleep quality(7). People living with human immunodeficiency virus often suffer from sleep disturbance with a prevalence ranging from 29 to 97 % among HIV seropositive patients(8).

Abnormal sleep patterns have been attributed to multiple factors including immune dysregulation; the direct effects of HIV in the central nervous system, and the effects of antiretroviral and lipodystrophy. Psychosocial factors—including depression, greater perceived stress, substance abuse,

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and poverty—which are known to significantly impact the quality of sleep, are also more prevalent in PLWH(9).

HIV infected individuals appear to be more vulnerable to poor sleep quality than the general population and factors associated with poor sleep quality (PSQI > 5) included age, education, transmission route, marital status, support from family/friends, time of diagnosed with HIV infection, drug adherence, number of ART regimens, current antidepressant use, and anxiety and depression(10).

The possible consequences of poor/ inadequate sleep may include neurologic, respiratory, or cardiac complications. diabetes; depression; falls; accidents; impaired cognition; poor quality of life; prolonged hospital or intensive care unit (ICU) stay; excessive daytime sleepiness (EDS); disturbed mood; poor functional performance; self-care deficits and increased mortality(11).

Despite HIVA/AIDS and sleep quality are significantly related, there are limited studies on sleep quality among PLWHA in Africa. As to the knowledge of the researcher, there is no data on sleep quality among PLWHA patients in Ethiopia. Therefore, it's worth to assess sleep quality status and associated factors among people living with HIV patients in Ethiopia, JUMC.

Methods and Materials

Study design and setting

Hospital-based cross-sectional study was conducted at Jimma University Medical Center (JUMC) antiretroviral therapy follow up clinic from June 1-30, 2018 among people living with human immunodeficiency virus (PLWHIV).Jimma town is found at 352 km from Addis Ababa, the capital city of Ethiopia in the southwestern part of the country. JUMC is the only teaching and referral hospital in the southwestern part of the country and providing specialized clinical services to about 15 million people in the catchment. Currently, 3100 adult people living with human immunodeficiency virus (PLWHA) are getting service in Jimma University Medical Center (JUMC) antiretroviral therapy follow up clinic.

Study participants

The source population of the present study was all People living with HIV/AIDS who have follow up visit in ART clinic Jimma University Medical Center ART clinics. The study population Sampled People living with HIV/AIDS who have follow up visit in ART clinic Jimma University Medical

Center ART clinics available during the study period. Those people living with HIV/AIDS patients whose age ≥ 18 years old were included in the study but those who were seriously ill and unable to communicate due to their illness at the time of data collection period were excluded.

Sample Size

Sample size was determined using a single population proportion formula. Taking 59.3% prevalence of poor sleep quality from previous similar study (12), 95% confidence interval (Z = 1.96) and 5% margin of error (d = 0.05), the initial sample size was372. By considering a 10% non-response rate, the final sample size was determined to be 410.

Sampling Technique

Systemic random sampling technique was used to select study participants by using skip interval of K = N/n =3100/410 =7.560 ≈ 8, n = total sample size K = skip interval N = Total study population. The first study participant was selected by lottery method first cases that attend ART clinic on day of data collection and then follow every 8^{th}study participant.

Study variable

Dependent variables: Sleep quality status

Independent variables

Socio-demographic: Age, sex, marital status, religion, ethnicity, educational status, socio-economic status, employment status, and monthly income.

Clinical factors: WHO stage of HIV status classification, CD4 count, viral load, Medication regime, Duration HIV/AIDS diagnosed, duration of ART medication and Co-morbid medical condition (diabetes mellitus and hypertension.

Mental health-related factors: Depression

Measurement

Data were collected using interviewer-administered structured questionnaire. The socio-demographic questions included information on age, sex, educational status, marital status, employment status, religion, ethnic group, and socio-economic status (SES) as monthly income for individuals based on Ethiopian currency.

To assess the sleep quality among PLWHA, Pittsburg Sleep Quality Index (PSQI) was used. This scale measures subjective aspects of sleep quality. It has a 19-item self-report measure designed to assess the previous month's sleep quality. Items are used to calculate seven component scores: subjective sleep quality (PSQI-quality; i.e.,

self-reported quality of sleep), sleep latency (PSQI-latency; i.e., amount of time to fall asleep), sleep duration (PSQI-duration; i.e., self-reported number of hours of sleep/night), habitual sleep efficiency (PSQI-efficiency; i.e., the amount of time spent asleep/the amount of time spent in bed), sleep disturbances (PSQI-sleep disturbance; i.e., awakenings during the night), using medication to sleep (PSQI-medication; i.e., use of prescription and over-the-counter medications used for the purposes of sleep), and daytime dysfunction (PSQI-daytime dysfunction; i.e., functional impairment during the day as a result of consequences of sleep loss). The sum of these components is used to calculate a global score. Global scores greater than five are indicative of clinical levels of poor sleep quality.

The Pittsburgh Sleep quality index (PSQI) has validated in Ethiopian adult population for the measurement of quality and pattern of sleep in adults. PSQI has sensitivity 82%, specificity 56.2%. Each component receives a score from zero to three, with the final score on the instrument ranging between0and 21. The higher the score, the worse the quality of sleep, and scores > 5 indicate poor sleep quality(13). Cronbach's alpha of the PSQI was 0.79 in this sample.

To screen depression was used Patient Health Questionnaire (PHQ-9)depression screening and diagnostic questionnaire for major depressive disorder MDD based on diagnostic and statistical manual of mental disorders, fifth edition (DSM-V) criteria which has 9 items specificity (67%) and sensitivity (86%) which was validated in Ethiopia with Amharic and Afan Oromo version with cronbachs alpha of 0.85 (14). These items include: 1)anhedonia 2)depr-essed mood 3) insomnia or hypersomnia 4)fatigue or loss of energy 5)appetite disturbances, 6)guilt or worthlessness, 7)diminished ability to think or concentrate 8)psychomotor agitation or retardation, and 9)suicidal thoughts. Scores for each item range from 0 ("not at all") to 3 "nearly every day" with a total score ranging from0 to 27.The PHQ-9 contains one additional item (item 10) which assesses functional impairment, also based on a three-point scale (not difficult at all, somewhat difficult, very difficult and extremely difficult. So, we used based on DSM V criteria more than five symptoms having depression.

For clinical factors were used patients chart review, that includes, WHO stage of HIV

status classification, CD4 count(the most recent), viral load(the most recent),current medication regimen, duration HIV/AIDS diagnosed, duration of ART medication and co-morbid medical condition (hypertension and diabetes mellitus).

Finally, the questionnaire was translated from English into Amharic and Affan-Oromo by Language experts of the three languages who are proficient in English and then back-translated into English by other translators to check its consistency in translation.

The data was collected by three B.Sc. psychiatry nurses supervised by two M.Sc. integrated clinical and community mental health students. Training was given for data collectors and supervisors were given on the research tool, data collection methods, and how to handle ethical issues.

Statistical analysis

Data were checked for its completeness; edited, cleaned and coded then entered into Epidata 3.1and exported to Statistical package for social science (SPSS) version20 for analysis. Bivariate analysis was used to identify factors associated with sleep quality among people living with HIV/AIDS. Variables with p-value <0.25 in bivariate analysis were considered as candidates for multiple logistic regressions. Multiple logistic regressions were performed using back ward Logistic Regression method to identify factors independently associated with dependent variables. P-value <0.05 was considered statistically significant Predictors of sleep quality among PLWHA at 95% of confidence intervals. We didn't do the correlation between the different HIV variants and their effect on sleep profile, because our dependent and independent variables were categorical variables and we used binary logistic regression.

Results

Study participants characteristics

A total of 410 respondents were enrolled in the study, making a 100% response rate. Of those enrolled, 287(70%) were females. The mean age of the participant was 37.49 years (SD ± 11.025).

Almost half of participants 206 (50.2%) were married. Concerning educational status, 77 (18.8%) of respondents were illiterate and 155(37.8%) of them attended elementary school. Regarding occupation, private employees were 85(20.7%) and 1.7%, of them were farmers. Almost all the respondents 390 (95.1%) they live in urban areas (table-1).

Table 1: Socio-demographic characteristics of study participants

Variable	Category	Frequency	Percent
Age	< 30	132	32.2
	30-35	76	18.5
	35-45	119	29.0
	>45	83	20.2
Gender	Male	123	30.0
	Female	287	70.0
Religion	Orthodox	204	49.8
	Muslim	146	35.6
	Protestant	50	12.2
	Catholic	7	1.7
	Other[R]	3	0.7
Ethnic group	Oromo	191	46.6
	Amhara	76	18.5
	Tigre	16	3.9
	Gurage	11	2.7
	Yem	80	19.5
	Other[E]	36	8.8
Educational status	Illiterate	77	18.8
	Elementary	155	37.8
	high school	95	23.2
	diploma and above	83	20.2
Marital status	Single	48	11.7
	Married	206	50.2
	Divorced	82	20.0
	Widowed	74	18.0
Occupation	Governmental employee	67	16.3
	private employee	85	20.7
	Merchant	50	12.2
	Farmer	7	1.7
	house wife	35	8.5
	daily laborers	60	14.6
	no job or unemployed	73	17.8
	other[O]	33	8
Monthly income(individuals income)	<200	144	35.1
	200-1000	147	35.9
	>1000	119	29.0
Residence	Urban	390	95.1
	Rural	20	4.9

NB :

Other[O] includes (students andretire)

Other[R]includes *(*Jehovah witness religion,wake feta)

Other[E]includes (Dawro, Silte, kefa and Wolayta)

Clinical characteristics

From the total study participants, 271(66.1%) of the participants had less than 500 CurrentCD4+ count, 129(31.5%) of the participant had greater than 50 viral copies, 172(42%) had 6-10 years since HIV diagnosis, 152(37.1%) had been 5-9 years on HAART medication, More than half 224(54.6%) of participants were taking 1E (TDF-3TC-EFV) medication groups and nearly half of them 181(44.1%) had the diagnosis of depression using PHQ-9 with cut of point greater than five (Table-2)

Table 2: clinical characteristics among people living with Human immunodeficiency virus

Variable	Frequency	Percent
Current (most recent) CD4+ cell count, cells/mm3		
<200	105	25.6
200-350	89	21.7
351-500	77	18.8
>500	139	33.9
Current (most recent) Viral load		
<50 copies(Undetectable)	264	64.4
>50 copies (detected)	129	31.5
Missing value =17	17	4.1
Time since HIV diagnosis		
<6 year	140	34.1
6-10 year	172	42.0
>10 year	98	23.9
Highly active antiretroviral therapy (HAART) regimen		
1c(Zidovudine+Lamivudine +Nevirapene)	90	22.0
1d(Zidovudine+Lamivudine +Efavirenz)	41	10.0
1e(Tenofovir+Lamivudine +Efavirenz)	224	54.6
1f(Tenofovir+Lamivudine +Nevirapene)	40	9.8
Other	15	3.7
Duration of ART medication		
<5 year	150	36.6
5-9 year	152	37.1
>9 year	108	26.3
Presence of comorbid hypertension		
No	388	94.6
Yes	22	5.4
Presence of comorbid diabetes mellitus		
No	392	95.6
Yes	18	4.4
Mental health-related factors characteristics		
Depression		
Depression	181	44.1
Non depression	229	55.9

Other:2f(AZT-3TC-ATV/r),2g(tdf-3TCLPV/r) and 2h(tdf-3tc-ATV/r)

Prevalence of sleep quality among people living with Human immunodeficiency virus

Seven components of sleep quality in the present study were assessed and identified their sleep quality status. Overall, more than half of the participants 59% reported poor sleep quality (having a score of greater than 5). The internal consistency of the instrument, for this specific population was good and with a Cronbach alpha = 0.79. The average sleep latency of the participants was 48.88 minutes. Out of all participants, 12% had fairly bad to very bad subjective of sleep quality clamming to have sleep awakening more than 4 to 5 times.

Out of total participants, 32% had sleep latency more than 60 minutes. Concerning sleep duration, 20% had slept less than 5 hours of actual sleep time. 44% had fairly bad to very bad sleep efficiency less than 74%and 20 (4.9%) used sleep medication within the past one month once or twice a week. About sleep disturbance problem30 % and 8.5%experienced fairly bad day time dysfunction. The mean score for sleep quality was 6.48 (SD ±4.553) after summation of the seven components in Pittsburg sleep quality scale(Table -3).

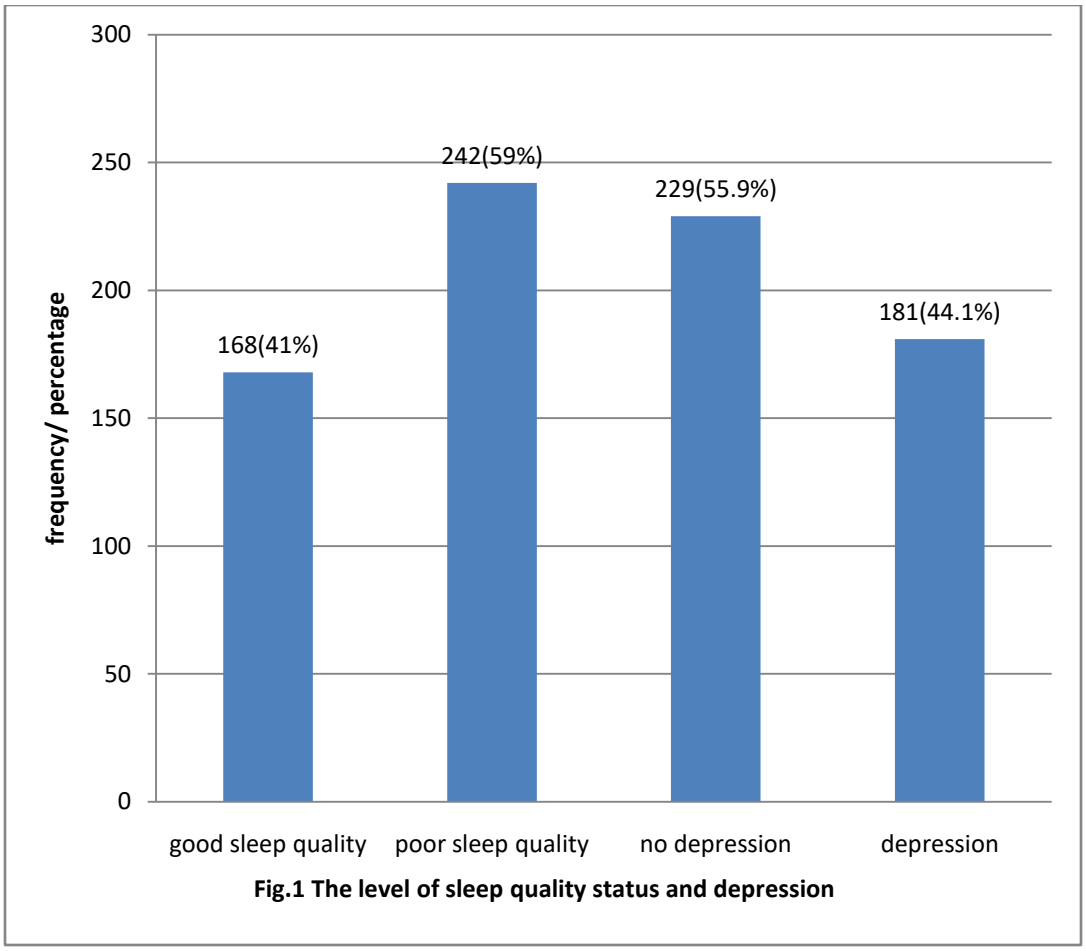

Fig.1 The level of sleep quality status and depression

Table 3: The Pittsburgh Sleep Quality Index (PSQI) subscale scores

variable	Frequency	Percent
Subjective sleep quality (Component 1)		
very good	177	43.2
fairly good	184	44.9
fairly bad	31	7.6
very bad	18	4.4
Total	410	100.0
Sleep latency (Component 2)		
0(<15 minutes)	155	37.8
1(16-30minutes)	30	7.3
2(31-60 minutes)	92	22.4
3(>60minuntes)	133	32.4

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Table 3: (continued)

variable	Frequency	Percent
Sleep duration (Component 3)		
>7 hours	110	26.8
6-7hours	95	23.2
5-6 hours	124	30.2
<5 hours	81	19.8
Total	410	100.0
Habitual sleep efficiency (Component 4)		
>85% (very good)	140	34.1
75%-84% (fairly good)	89	21.7
65%-74% (fairly bad)	71	17.3
<65 % (very bad)	110	26.8
Total	410	100.0
sleep disturbances (Component 5)		
0 (very good)	168	41.0
1-9(fairly good)	120	29.3
10-18 (fairly bad)	85	20.7
19-27(very bad)	37	9.0
Total	410	100.0
use of sleep medicine (Component 6)		
not during at all	380	92.7
less than once a week	10	2.4
once or twice a week	20	4.9
Total	410	100.0
Daytime dysfunction (Component 7)		
0(Very good)	329	80.2
1(Fairly good)	45	11.0
2(Fairly bad)	35	8.5
3(Very bad)	1	0.2
Total	410	100.0

Factors associated with sleep quality

In the bi-variable logistic regression analysis, variables such as marital status, education, occupation and household monthly income, most recent CD4 count, viral load, HAART regimen and depression were candidate for multiple logistic regression with (P-value <0.25).

Table 4: Multivariable logistic regression analyses of determinants with poor sleep quality

Variables	Global PSQI score		Multivariable result	
Marital status	Poor sleeper	Good sleepers	AOR(95%C.I)	P-value
Single	26(10.7%)	22(13.1%)		1
Married	110(45.5%)	96(57.1%)	1.13(0.49, 2.57)	0.769
divorced	52(21.5%)	30(17.9%)	1.84(0.71, 4.74)	0.206
widowed	54(22.3%)	20(11.9%)	**2.85(1.11, 7.32)**	0.029*
Occupation				
governmental employment	28(11.6%)	39(23.2%)		1
Private employment	52(21.1%)	34(20.2%)	1.74(0.82,3.71)	0.148
merchant	29(12%)	21(12.5%)	1.25 (0.53, 2.91)	0.612
farmer	4(1.7%)	3(1.8%)	1.08 (0.19, 6.09)	0.933
house wife	36(14.9%)	19(11.3%)	**2.31 (1.01,5.28)**	0.047*
daily laborers	16(6.6%)	24(14.3%)	0.59(0.22, 1.56)	0.300
unemployed	54(22.3%)	19(11.3%)	2.23 (0.94, 5.28)	0.069
Other	24(9.9%)	9(5.4%)	**3.26 (1.07, 9.90)**	0.037*
Current CD4 count				
<200	75(31.0%)	30(17.9%)	**2.48 (1.33, 4.62)**	0.004*
200-350	55(22.7%)	34(20.2%)	**2.34 (1.24, 4.64)**	0.009*
351-500	47(19.4%)	30(17.9%)	**2.18 (1.12, 4.21)**	0.021*
>500	65(26.9%)	74(44.0%)		1
Current (most recent) Viral load				
<50(Undetectable)	137(56.7%)	127(75.5%)		1
>50copies(detectable)	93(38.4%)	36(21.4%)	**1.91 (1.12, 3.25)**	.017*
Depression				
Depression	146(60.3%)	35(20.8%)	**6.55(3.91, 10.97)**	0.000*
Non depression	96(39.7%)	133(79.2%)		1

NB: *=statistically significant at p-value <0.05

Other^{O}: includes (students and retire)

Multivariable logistic regression Factors independently associated with sleep quality

All variables that had p<0.25 in the bivariate analysis were included in multivariate analysis for backward logistic regression. From total variables included in the logistic regression models, five variables were found to be statistically significant at the level of p<0.05. Accordingly: marital status, occupational status, CD4 counts, viral load and depression of study participants were demonstrated statistically significant association with sleep quality.

As of this result, participants were Being widowed 2.85 times [AOR= 2.85, 95%CI (1.11, 7.32)] more likely to develop poor sleep quality than single. Regarding occupation being housewife two times more likely to develop than governmental employer [AOR=2.31,95%CI (1.01, 5.28)] and Being student and retire three times more likely to develop poor sleep quality than governmental employment [AOR=3.26, 95% CI (1.07, 9.90)].

Participants who have less than 200 CurrentCD4+cellcount, cells/$mm^3$2.48timesmore likely to develop poor sleep quality than persons who have greater than 500 CurrentCD4+ cell count, cells/mm^3[AOR=2.48, 95% CI (1.33, 4.62)]. Current viral load participants who had greater than 50copies/ml nearly two times [AOR=1.91, 95% CI (1.12, 3.25)] more likely to suffer from than persons who have <50 copies/ml or undetectable. Participants who had depression 6.55[AOR=6.55, 95% CI (3.91, 10.97)] time more likely to develop poor sleep quality than participants who have no depression table (4).

Discussions

The finding of this study showed that more than half of the HIV positive patients (59%) of them had poor sleep quality (PSQI>5). This finding is in line with a study done in Nigeria, according to the PSQI,(59.3%) patients reported poor sleep quality(12) and study done in USA (58.0 %; 95% CI = 49.6–66.1),(15,16).However, the finding of this study is higher than the studies done in china among43.1% (PSQI>5)(10),47 % in French (17), 47.5 % in South Nigeria(18),in Italy(46.9%) (19) and 42% in Romanian(20)HIV positive patients. The reason for these difference might be cultural difference because, cultural differences in sleeping locations (on the ground, on communal platforms, in beds, etc) and sleeping partners (alone, with a spouse, with immediate family, in community groups, etc) in different traditions and societies also have a bearing on the timing, duration and regularity of sleep. On the other hand, this study showed that one third (32.4%)of HIV positive patients had sleep latency more than 60 minutes. This finding is in line with study results in US, which reported that 31% of HIV patients reported an extended sleep latency(6).Moreover, the study participants reported reduced sleep duration 30.2%, fairly bad to very bad sleep efficiency (44%), problem of sleep disturbance30% and fairly bad to very bad subjective of sleep quality12%.However, this result was contradicted with study findings conducted

among Romanian HIV patients who reported decreased in subjective sleep quality (51.96%), increased sleep latency (49%), reduced sleep duration (48%) and reduced sleep efficiency (37.2%)(20).This difference might be related to health literacy, socioeconomic and living standard differences between the participants.

In this study those respondents being widowed two times more likely to develop poor sleep quality than single. This finding is supported by a study done in Iran (21). The possible reason might be they have stress, economical burden and it might be having the felling of lowliness and rejection. Also, this study found that housewife ART patients had two times the odds of developing poor sleep quality than ART patients with governmental occupational status. This finding is in line with a study done in China (22).Moreover, ART patients, who were retired and students had three times the odds of poor sleep quality than government-employed ART patients. This finding consistent with a study done in southern United States(23).This could be that limited financial sources or income might have negative consequences on sleep quality of ART patients. On the other hand, in this study, ART patients with higher viral load showed nearly two times the odds of poor sleep quality than patients with lower viral load. This finding in line with the study done in Los Angeles(24),USA (25) and West Africa(26).

This indicates that viral load might hurt sleep quality of HIV positive patients. The possible reason might be the detectable levels of HIV in a viral load test, it means there is a significant amount of HIV in their blood. HIV has been shown to cause sleep disturbances very early on in infection and has been hypothesized to be associated with the rapid and hyperactive immune response soon after infection. In addition, HIV had the ability to cross the blood-brain-barrier and directly affect the glial cells – resulting in sleep alterations. During primary HIV infection, HIV crosses the blood brain barrier and infects microglial cells, astroglia and macrophages. Among the products which these activated cells produce are IL-1, IL-6, and TNFα .These cytokines have already been shown to cause alterations in sleep(27).

Similarly, this study indicated that HIV positive patients with lower CD 4 count were two times more likely to suffer from poor sleep quality than patients with higher CD4 count. This finding is consistent with a

study conducted in Miami (28),in African-American(29) and South Nigeria (18). This could be the CD4 the immune system is directly linked to the psyche by a complex network of nerves, hormones, and neuropeptides. This network of specific physiological pathways allows immune function to have a direct impact on health especially sleep. On the other hand patient with lower CD4 cell counts are by definition in the AIDS stage, which is associated with greater medical co-morbidity. Sleep quality declines linearly as the number of co-morbid medical conditions increases(30).

This study indicates that ART patients with depression had six times the odds of exposure to poor sleep quality than HIV patients without depression. This finding is supported by a study done in Mexico City(16), French, Italy(17,19), US and southern United States(10,31).This indicates that the presence of co-morbidities of mental disorders further complicates the sleep quality of HIV positive patients. On the other hand In our study, the prevalence of depressive symptoms (44.1%) was lower than that of poor sleep quality (59.3%), suggesting the importance of distinguishing poor sleep quality caused by depression from that resulting from other causes. It could be the most plausible mechanism being that elevated cortisol levels during episodes of depression decrease slow-wave sleep, increase the number of intermittent awakenings and reduced total sleep time(32).

In our study, there were no significant associations of current medication regimens use and duration of the illness with sleep quality. This finding is supported by a study done in southern United States(33). However, this result was contradicted with study finding conducted among Sub-Saharan Africa HIV patients(8)and in Mexico City (16).

Limitations of the study

This study has some limitations. The study being a cross-sectional study cannot we identify the cause-effect relationship between sleep quality and associated factors and some data that can impact sleep quality have not been collected in our study i.e. painful neuropathy, chronic pain and other reason. However, in question 5i of PSQI some are including but with no characteristic on the kind of pain and other reason. The PSQI is a broad subjective measure intended to assess several domains of sleep; thus, it might over or underestimate certain sleep parameters relative to objective measures of

sleep, such as polysomnography or actigraphy.

Conclusions

The prevalence of poor sleep quality in our set up relatively higher than any other prevalence reported before. So in our study, we found that having depression, lower CD4 count, high viral load, marital status and occupational status strongly associated with poor sleep quality among HIV-infected patients in multivariate analysis. So improving the CD4 count with good drug regimen and screening for depression treating and other factors can improve sleep quality of HIV patient. Also by providing counseling on the importance of adequate sleep hygiene, it helps to improve the health of people living with HIV.

Finally, addressing sleep quality problems among people living with HIV recommended to be taken seriously. Since, it has significant association with the decreased CD4 count and high viral load which affects the survivability and outcome of patient with HIV. Therefore, clinicians recommended inquire about sleep quality of each client routinely and search for the cause of poor sleep and treat it accordingly recommended to be a priority.

Abbreviations

3TC: Lamivudine;ABC: Abacavir;AIDS: Acquired Immunodeficiency Syndrome;AOR: Adjusted Odds Ratio;ART: Antiretroviral Therapy; AZT: Zidovudine;CD4:Cluster of Differentiation (cells) ; CNS: Central Nervous System; EFV: Efavirenz; HIV:Human Immunodeficiency Virus; JUMC:Jimma University Medical Center;LPV/r: Lopinavir with ritonavir booster; NVP: Nevirapene;PHQ9 :Patient Health Questionnaire ; PLWHIV: Persons living with Human Immunodeficiency Virus ;PSQI: Pittsburgh Sleep Quality Index ;REC: Research Ethics Committee ;SPSS=Statistical Package for Social Sciences;TDF: Tenofovir

Ethics approval and consent to participate

The research was approved by the Institutional Review Board at Jimma University (Ref. No.: JHRTGD /334/2018), before data collection. Permission was obtained from Jimma university medical center ART clinic. The objectives of the study and its benefits were explained in a language they can understand. Study participants were informed that the study would not have any risks. Furthermore, items seeking personal

information (like name, phone number, and identification numbers) were kept confidential.

Consent for publication: not applicable

Availability of data: The datasets used & analyzed during the current study are available from the corresponding author on reasonable request.

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Authors' contribution: Workua Mdesigned the study, collected data, analyzed the data and reviewed the manuscript. Elias T, Abraham TG and Hailemariam H; designed the study, supervised data collection, analyzed the data, drafted the manuscript and critically reviewed the manuscript.All authors read and approved the final manuscript.

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