

# Behavioral Nursing Intervention for Promoting Sleep Pattern and Daily Living Activities among Human Immunodeficiency Virus Patients

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**Abstract:** Sleep is a normal process that repairs body functions including health of the immune system. Human Immuno-deficiency Virus people have a high prevalence of sleep disturbance due to unique factors. Behavioral intervention is known to be an effective method for improving sleep quality in these people. **Aim:** This study was conducted to examine the effect of a behavioral nursing intervention on promoting sleep pattern and daily living activities among human immunodeficiency virus patients. **Design:** A quasi-experimental design with pre and post-test was used. **Setting:** The study was conducted at the counseling and investigation unit in Tanta fever hospital, Al-Gharbia Governorate. **Sample:** Purposive sample consisted of 116 of Human Immunodeficiency Virus adults attending the counseling and investigation unit were included in the study. **Tools:** It included structured interview questionnaire, Pittsburgh Sleep Quality Index scale (PSQI) and Katz Index of Independence in activities of daily living scale. **Results:** This study showed that about three-fourths (72.4%) of the study sample had poor sleep quality and 7.8% were moderate dependent in their daily living activities. Furthermore, there was a significant improvement in sleep quality and sleep pattern at post intervention compared to pre-intervention. Moreover, there was a significant improvement in the level of independence in daily living activities at post-intervention, compared to pre-intervention. **Conclusion:** Behavioral nursing intervention was effective in promoting sleep quality, pattern and daily living activities among human immunodeficiency virus people. **Recommendations:** Behavioral nursing intervention and awareness program about sleep promotion among human immunodeficiency virus patients in outpatient and counseling clinics are needed.

**Keywords:** Behavioral intervention, Daily living activities, Human Immuno-deficiency Virus, Sleep quality, Sleep pattern.

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## 1. INTRODUCTION

Sleep is a physiological process that has been suggested to have curative and monitoring properties. It has a specific concern in the latest years due to its effect on the immune system. Sleep deprivation modifies various components of the immune system. Also sleep patterns are changed during the immune reaction, telling that sleep and the immune reaction are connected through bidirectional communication. So, shortage of sleep leads to immunity weakness and organism susceptibility to infection progress. (Ibarra et al., 2015).

Most of the Human immunodeficiency virus (HIV) adults reporting sleep disorders at some point during their disease, compared to general population. Many researchers have revealed the bad effects of poor sleep quality on general health and life quality. Also, sleep disturbances population are suffering from impaired daytime functioning as attention and concentration difficulties, memory impairment, general fatigue, diminished ability to accomplish daily tasks and increased health care utilization (Saber et al., 2011).

There are several unique factors have been found to affect sleep in HIV population including medical variables as kind of HIV medication, longevity of HIV infection, load of HIV virus, existence of other diseases, social and environmental variables such as living circumstances (noise, private place, security) and social care; plus personal features such as the state of employment, addiction, stress and sleep traditions (Weber et al., 2013).

Sleep disturbance can be treated with medication or by other methods, but for HIV positive patients on antiretroviral therapy, drug interaction may be a concern, so the clinician prefers to start treatment with a non-drug approach to minimize complications. Behavioral interventions can enhance sleep pattern in a low difficult way and more efficiency than pharmacological method. Previous studies concluded that behavioral interventions concentrating on environmental factors and sleep hygiene have extra effective than medical interventions to improve sleep in HIV population (Chen et al., 2012).

Behavioral therapy is an umbrella term for types of therapy that treat many health disorders. This form of therapy seeks to identify and help change the potentially self-destructive or unhealthy behaviors. It functions on the idea that all behaviors are learned and that unhealthy behavior can be changed. The focus of treatment is often on current problems and how to change them. Behavioral therapy has successfully been used to treat a large number of conditions. It's considered to be extremely effective (Gotter, 2016)..

Many behavioral interventions that are designed for treatment of sleep disturbances, containing stimulus control therapy, sleep restriction therapy, muscle relaxation and sleep hygiene, are known to be effective methods. Recommendations include keeping fixed sleep time and rising times, control of napping during daytime and limiting time in bed. Additionally, nutritional recommendations which include maintaining regular meal times, avoiding drinks, smoking, caffeine and voiding before sleep. The environment of sleep should not be excessively hot or cold and reduction of excessive light and sound (Cynthia & Deschenes, 2009).

Community health nurse plays a vital role as a guidance and a counselor to HIV patients through giving them the knowledge related to HIV prevention and transmission, given care and support to already infected patients and decreasing the liability of individuals and populations to HIV, also providing them with sleep hygiene education, that will result in a change in their knowledge and attitudes toward sleep and raise patient's awareness to the problem. A behavioral nursing intervention for promoting sleep pattern detailing non-pharmacologic sleep hygiene guidelines should be provided to improve sleep quality. The primary focus of the education should highlight the strategies and the importance of healthy sleep behaviors and also the environmental stimuli such as noise, bright lights, clinical interruptions, and uncomfortable temperature that have a direct effect on sleep disturbance (Massengale, 2015).

### 1.1 Significance of the study:

The World Health Organization (WHO) declared that, HIV is considered major public health problem. Globally, more than one million person pass away due to HIV infection, and around 36.7 million people existing with HIV, additionally, In the year of 2015, about two millions person are newly infected with HIV (WHO, 2017). In Egypt, according to the joint United Nations program on AIDS (UNAIDS), the registered number of people above fifteen years old who were living with HIV in 2014, were 7.200 person with a range of 4.400 to 12.000 person, and the average number of people living with HIV in 2015 is around 11000 person ranged between 7200-19000 person. Additionally, Cairo and Alexandria have about one-third of the country infected population (UNAIDS, 2015). Physical, mental, and emotional functioning can be affected by sleep troubles and have been stated in people living with HIV. Sleep disturbances have a high prevalence among these people estimated by 73% (Taibi et al., 2014). To maintain good sleep, both quantity and quality are important. Behavioral nursing intervention will be given to these patients as sleep hygiene in a variety of practices like modification in daily habits and environmental factors in an effort to guarantee more peaceful and effective sleep that can

encourage daytime awareness and help to avoid definite forms of sleep complaints and improve their daily living activities (Sharma, 2015).

### 1.2. Aim of the study:

The aim of this study was to examine the effect of the behavioral nursing intervention on promoting sleep pattern and daily living activities among human immunodeficiency virus patients.

### 1.3. Research hypotheses:

- Human immunodeficiency virus patients who will receive the behavioral nursing intervention will have improvement in sleep pattern and sleep quality compared to pre-intervention.
- Human immunodeficiency virus patients who will receive the behavioral nursing intervention will have improvement in their daily living activities compared to pre-intervention.

## 2. SUBJECTS & METHOD

**2.1. Research design:** Quasi-experimental design with pre and post-test was used to achieve the aim of the study.

**2.2. Research setting:** This study was conducted at the counseling and investigation unit at Tanta fever hospital that follows Ministry of Health in Al-Gharbia Governorate, Egypt.

**2.3. Research sample:** A convenience sample consisted of 116 out of 240 Human Immunodeficiency Virus (HIV) adults who were registered in 2016 at the counseling and investigation unit, under treatment regimen and agreed to participate in the study.

### Exclusion criteria:

- Human immunodeficiency virus patients with a history of psychiatric disorders as (seizure, mania & dementia) were excluded, because sleep restriction therapy is contraindicated for them, and the ability to complete the questionnaires and recall of management related instructions is low.

### 2.4. Tools of the study:-

**I: Structured interview questionnaire:** It was developed by the researchers after revising the literature to collect the necessary data from the HIV patients. It included the following data:

#### A - Socio-demographic data:

It concluded participant's age, sex, occupation, residence, marital status, level of education and income level which was classified into two categories according to family income per month as sufficient and not sufficient.

#### B - Medical assessment questionnaire:

It was reported by asking the patient about HIV history which included 3 questions. The first question was about the duration of infection with HIV disease if less or more than 5 years. The second question was about the regularity of taking HIV medication and the third question was asking the patient about taking any medications other than HIV medication. The response to the last two questions was in the form of yes or no.

## II. Pittsburgh Sleep Quality Index (PSQI).

This scale was established by Buysee, Reynold, Monk, Berman & Kopfer, (1989). The PSQI consisted of nineteen questions, which assessed many factors related to sleep quality, such as estimation of sleep duration and sleep latency, also measuring the frequency and harshness of specific sleep problems during the last month. These nineteen questions were collected into the score of seven components, each one weighted equally on scale from 0-3. The seven components included subjective sleep quality, sleep duration, habitual sleep efficiency, sleep latency, sleep medications, sleep disturbances and daytime dysfunction. Adding the seven components scores together formed the global score of PSQI, which had a range between 0-21 score. Total score of 5 or more indicated poor sleep quality and less than score of 5

indicated good sleep quality. The behavioral intervention was implemented for HIV patients with poor sleep quality who got a score of 5 or more.

### **III: Katz Index of Independence in Activities of Daily Living Scale (Katz ADL):**

It was developed by Shelky & Wallace (1998). This scale referred to as the Katz ADL, which is the most suitable instrument to measure the functional status and the client's capability to accomplish his daily living activities individually. Clinicians typically use the tool to detect problems in performing activities of daily living and to plan care accordingly. The index grades the suitability of performance in the six functions of bathing, toileting, dressing, continence, transferring and feeding. The response of the questions was in the form of yes or no. Each answer with yes means independence and equal one score, while each answer with no means dependence and equal zero score. Scoring system of patient independence in daily living activities was categorized as the following: Score of six point to full function and score of four point to moderate impairment, while score of two or less directed to severe functional impairment.

#### **2.5. Validity and Reliability of the tools:**

The tools (PSQI scale & ADL scale) were tested for content validity by three experts from community health nursing department and psychiatric nursing department. Questions were translated from English to Arabic and then retranslated to English for meaning consistency. Reliability of the tools were measured for testing the internal stability by using test-retest reliability for a group of 11 participants who were asked to fill the questions and were asked again to refill the same questions under the similar condition. The answers in the two testing were analyzed and computed for reliability. Overall Chronbach's alpha for Pittsburgh Sleep Quality Index was 0.85, and Katz Index of independence scale was 0.80 which is accepted and indicated good internal consistency.

#### **2.6. Pilot study:**

Before starting the data collection process, a pilot study was implemented using the established questionnaire on 11 participants. The pilot study was conducted to check the clarity and applicability of the questionnaire and identifying any difficulties or problems that may arise during the actual data collection process. Furthermore, to estimate the time needed for sheet refill, the necessary modification and clarification was done. The pilot sample not included in the study to maintain results stability.

#### **2.7. Administrative approval and ethical considerations:**

An official letter from the Faculty of Nursing dean in Menoufia University was taken to the director of Tanta fever hospital in Al-Gharbia Governorate to obtain the approval to collect the required data. Permission to accomplish the study from responsible authorities of the selecting settings was obtained after explaining the study purpose and methods of data collection. The researchers kept their eyes on all the ethical considerations in conducting the research. Verbal consent agreements of subjects were taken after the detailed explanation about the study was done. Subjects were reassured regarding information confidentiality and maintaining no harmful effects from the study maneuver.

#### **Procedure for data collection:**

- Data collection for this study was carried out at the first of October 2016 and completed by the end of March 2017.
- The data was collected using structured interview questionnaire once permission was granted, the researchers initiated collection of data. In the beginning, the researchers introduced themselves and gave details about the purpose of the study to the patients through arranging a meeting in the HIV counseling and investigation unit.
- Each patient who approved to participate in the study and fulfilled the selection criteria was asked to fill the questionnaire for a period of 20 minutes to collect socio-demographic data, sleep quality and daily living activity questions.
- After collection of the pretest data, patients who have sleep disturbance (score of 5 or more) were included in the behavioral intervention.

- Patients who were included in the intervention were divided into groups, each group consisted of 10-15 patients. Each group attended two sessions and the duration of each session was 30 minutes.
- The first session included information about the definition of HIV, mode of transmission, ways of protection, the importance of sleep, sleep disturbances and its effect on health and daily living activities, information about healthy nutrition and HIV medication.
- The second session included a detailed explanation of the behavioral intervention for promoting sleep pattern and the guidelines of using each therapy which included; Sleep hygiene education that requires reviewing a set of instructions to help maintain good sleep habits such as avoiding tobacco, alcohol, large meals and vigorous exercise. Also, sleep restriction therapy which consisted of limiting the amount of time spent in bed compared to the actual amount of time spent in sleep. Additionally, stimulus control therapy that aimed at maintaining quiet environment and the concise use of bed room for sleep. Furthermore, the relaxation therapy which was used to reduce physical and mental tension, its common types are progressive muscle relaxation and imagery.
- Each session followed by a summary of essential points. The teaching methods included lectures, group discussion, while the teaching media included data show and hand out (booklets).
- In the last session, patients were given a guide booklet which was developed by the researcher; provided with pictures and include all the information given during the intervention relate to sleep, ways to improve sleep, daily living activities, HIV as an infectious disease and ways of protection from the infection, the healthy nutrition, and medication instructions.
- At the end of the intervention period which continued for three months, post-test was performed using the same pretest questionnaire.

#### Statistical analysis:

Data was coded and converted into specially designed system to be fit for computer entry process. The coded data was entered and analyzed through the use of SPSS program (Statistical Package for Social Science) version 22. Graphics were done by Excel program. The mean ( $\bar{X}$ ) and standard deviation (SD) were used for quantitative data. The non-parametric tests were used (Wilcoxon signed-rank test) if the data were not normally distributed. Spearman correlation test was used for continuous data. It was analyzed by Chi-square ( $\chi^2$ ) test. Qualitative data were presented in the form of frequency distribution tables, number, and percentage; however, if an expected value of any cell in the table was less than 5, Fisher Exact test was used. Mann-Whitney test was used for comparison between means of two groups of non-parametric data of independent sample. McNemar test was used to specify the presence of any significant difference between different time sequences for qualitative variable. Paired t- test was used for comparison between means of two associated groups (before & after data) of parametric data. Level of significance was fixed when P value decreases than 0.05 for all significant tests.

### 3. RESULTS

**Table 1:** Shows that, the mean age of the study sample was  $34.58 \pm 9.27$  years, more than two thirds (72.4%) of the study sample were males and less than one fourth (19.8%) were married. Regarding to place of residence, about two thirds (66.4%) of the study sample were from urban areas. Concerning to education level and occupation, about one half (48.3%) were illiterate and the most (90.5%) were working. Regarding to patient income, about three fourths (74.1%) had income insufficiency.

**Table2:** Shows that more than half (53.4%) of the study sample reported their sleep quality as fairly good, while less than half (44.7%) of the sample reported their sleep quality as fairly bad and very bad. Regarding sleep latency, more than one fourth (29.3%) of the study sample had long sleep latency 31- 60 minute or > 60 minutes. Concerning to sleep duration per night, more than one fourth (29.3%) reported that they used to sleep less than 7 hours per night. Regarding sleep efficiency and sleep disturbance, more than one third (37.9%) of the study sample had low sleep efficiency (<85%) and about two thirds (63.8%) had sleep disturbance once or twice a week and 28.45% reported having daytime dysfunction three or more times a week.

**Figure (1):** Shows that, about three-fourths (72.4%) of the study sample have poor sleep quality while more than one fourth (27.6%) of the study sample had good sleep quality.

**Figure (2):** Shows that the most (92.2%) of the study sample had reported full function in their daily living activities, only 7.8% had moderate impairment, while no severe impairment had been found in the daily living activities.

**Table (3):** Shows that there was a significant relationship among sex, social status, sufficiency of income, longevity of HIV infection and sleep quality. Poor sleep quality was significantly more prevalent in female (90.6%), in widows (86.2%), in participants who have insufficiency of income (93%), and in those infected with HIV more than 5 years (100%), while no significant relationship between age, residence, educational level, occupation and sleep quality.

**Figure (3):** Shows that there was a significant negative correlation between the score of sleep quality and the score of independence in activities of daily living ( $r = - 0.712$ ,  $p$ -value  $<0.001$ ). When the global sleep score increase more than 5, the score of independence in activities of daily living decrease less than 2.

**Figure (4):** Reveals that, all the study sample (100%) who had reported poor sleep quality at pre-intervention, decreased to 44 at post-intervention with statistically significant difference between pre and post-intervention.

**Table (4):** Illustrates that there was a significant variance between pre and post intervention regarding to time taken to fall a sleep each night, time of going to bed, hours of actual sleep at night, time spending in bed and time of getting up in the morning.

**Table (5):** Shows that there was a significant variance between pre and post intervention concerning the mean score of subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleep medicine and daytime dysfunction.

**Figure (5):** Shows that there was a significant improvement in independence level of daily living activity, as 92.2% of the study samples were independent in their daily living activities at pre-intervention, compared to 98.8% of the sample at post-intervention.

**Table (1): Distribution of socio-demographic profile of the human immunodeficiency virus patients (n=116).**

Socio-demographic characteristics	No.	%
<b>Age (years)</b>		
Range	(18-55)	
Mean $\pm$ SD	34.58 $\pm$ 9.27	
<b>Sex</b>		
Male	84	72.4
Female	32	27.6
<b>Marital status</b>		
Married	23	19.8
Single	59	50.9
Widow	29	25.0
Divorced	5	4.3
<b>Residence</b>		
Urban	77	66.4
Rural	39	33.6
<b>Educational level</b>		
Illiterate	56	48.3
Primary	31	26.7
Secondary	10	8.6
University	19	16.4
<b>Occupation</b>		
Working	105	90.5
Not working	11	9.5
<b>Income sufficiency</b>		
Sufficient	30	25.9
Not sufficient	86	74.1

Table (2): Distribution of sleep quality components according to Pittsburgh Sleep Quality Index among the study sample (n=116).

Sleep quality components	No.	%
<b>Subjective sleep quality</b>		
Very good	2	1.7
Fairly good	62	53.4
Fairly bad	36	31.03
Very bad	16	13.7
<b>Sleep latency</b>		
<15 min	10	8.6
15-30 min	72	62.1
31- 60 min	23	19.8
> 60 min	11	9.5
<b>Sleep duration</b>		
> 7 hrs.	82	70.7
6- 7 hrs.	26	22.4
5 - 6 hrs.	8	6.9
<b>Habitual sleep efficiency</b>		
> 85%	72	62.1
75% - 85%	21	18.1
65% - 74%	10	8.6
< 65%	13	11.2
<b>Sleep disturbances</b>		
Not during the past month	1	0.9
Less than once a week	26	22.4
Once or twice a week	74	63.8
Three or more times a week	15	12.9
<b>Sleep medicine</b>		
Not during the past month	103	88.8
Less than once a week	9	7.8
Once or twice a week	4	3.4
<b>Daytime dysfunction</b>		
Not during the past month	23	19.8
Less than once a week	41	35.3
Once or twice a week	19	16.4
Three or more times a week	33	28.4

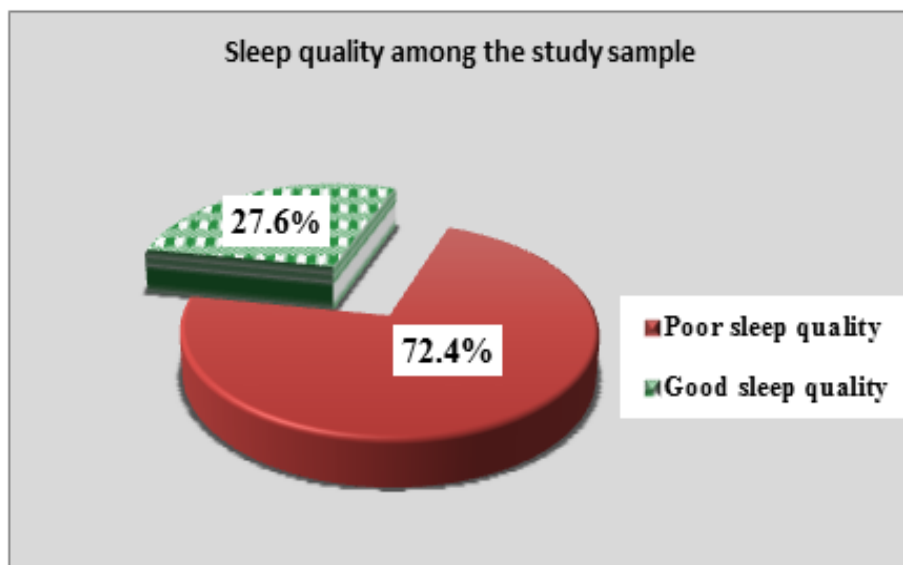


Figure (1): Distribution of sleep quality according to PSQI among the study sample (n=116)

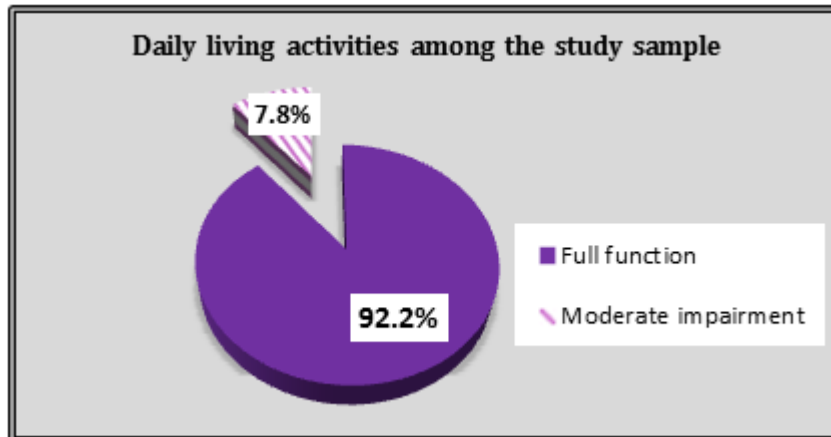


Figure (2): Distribution of independence in activities of daily living among the study sample (n=116)

Table (3): Distribution of socio-demographic characteristics according to sleep quality among the study sample (n=116)

Socio-demographic data	Sleep quality				$\chi^2$	p-value
	Poor sleep (N0.=84)		Good sleep (No.=32)			
	No.	%	No.	%		
<b>Age (years)</b>	34.5± 8.772		34.41± 10.728		0.048	0.962
<b>Sex</b>					7.33	0.007*
Male	55	65.5	29	34.5		
Female	29	90.6	3	9.4		
<b>Social status</b>					7.82	0.040*
Married	13	56.5	10	43.5		
Single	41	69.5	18	30.5		
Widow	25	86.2	4	13.8		
Divorced	3	70.0	2	30.0		
<b>Residence</b>					2.03	0.154
Urban	59	76.6	18	23.4		
Rural	25	64.1	14	35.9		
<b>Educational level</b>					6.25	0.100
Illiterate	38	67.9	18	32.1		
Primary	24	77.4	7	22.6		
Secondary	5	50.0	5	50.0		
University	17	89.5	2	10.5		
<b>Occupation</b>					0.96	0.493
Working	77	73.3	28	26.7		
Not working	7	63.6	4	36.4		
<b>Sufficiency of income</b>					4.11	0.043*
Complete sufficiency	26	86.7	4	13.3		
Incomplete sufficiency	80	93.0	6	7.0		
<b>How long HIV infected</b>					12.14	<0.001*
More than 5 years	25	100	0	0.00		
Less than 5 years	59	64.8	32	35.2		



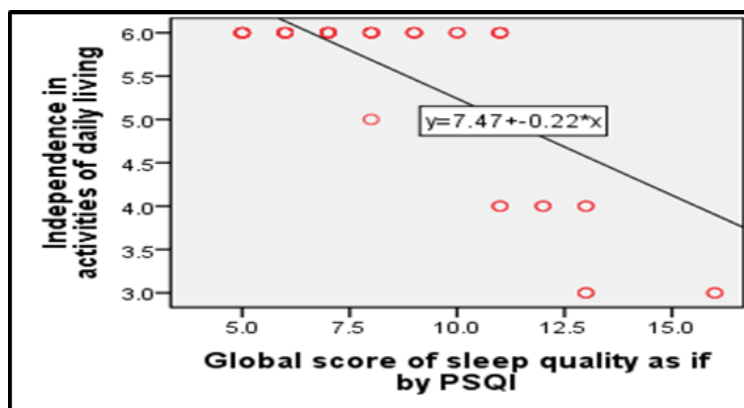


Fig (3): Correlation between independence in activities of daily living and sleep quality (n=84)

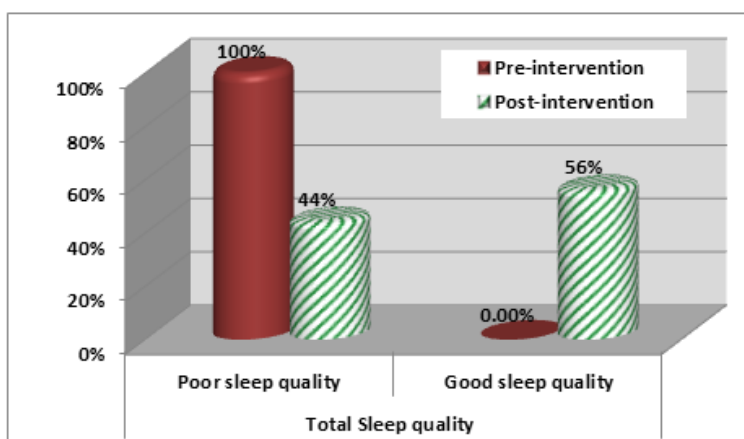


Fig (4): Distribution of sleep quality according to PSQI at pre and post intervention (n=84)

Table (4): Distribution of sleep pattern along one month at pre & post-intervention among the study sample (n=84)

Sleep pattern	Pre-intervention		Post-intervention		$\chi^2$	p-value
	No.	%	No.	%		
<b>Time taken to fall sleep</b>						
< 15 min	21	25	42	51.2	30.821	<0.001*
15 - 30 min	9	10.7	29	35.4		
31 - 60 min	43	51.2	11	13.4		
> 60 min	11	13.1	0	0.00		
<b>Time of going to bed</b>						
7 - < 8 pm	20	23.8	7	8.31	24.788	<0.001*
8 - < 9 pm	12	14.3	28	33.3		
9 - < 10 pm	15	17.9	31	36.9		
≥ 10 pm	37	44.0	18	21.4		
<b>Hours of actual sleep at night</b>						
>7 hrs.	55	65.5	59	70.2	5.785	0.008*
6 - 7 hrs.	21	25.0	24	28.6		
5 - 6 hrs.	8	9.5	1	1.1		
<b>Time spending in bed</b>						
5 - < 6 hrs	3	3.6	3	3.60	11.733	0.008*
7 - < 8 hrs	37	44.0	58	69.0		
9 - < 10 hrs	35	41.7	20	23.8		
≥ 10 hrs	9	10.7	3	3.60		
<b>Time of getting up morning</b>						
6 - < 7 am	30	35.7	35	42.7	11.817	0.008*
7 - < 8 am	15	17.9	28	34.1		
8 - < 9 am	29	34.5	16	19.5		
≥ 9 am	10	11.9	3	3.7		

Table (5): Mean score of sleep quality components at pre and post intervention (n=84)

Sleep quality components	Intervention		Test of sig	p-value
	Pre	Post		
	Mean ±SD	Mean ±SD		
Subjective sleep quality	1.60 ± 0.73	0.62 ± 0.75	Wilcoxon =9.05	<0.001*
Sleep latency (in minutes)	31.61 ± 20.85	22.08 ± 15.44	Wilcoxon =7.54	<0.001*
Sleep duration (in hours)	7.42 ± 0.96	8.10 ± 0.90	t=15.33	<0.001*
Habitual sleep efficiency(%)	81.14 ± 9.13	85.10 ± 7.54	t=13.78	<0.001*
Sleep disturbances	17.15 ± 4.74	13.96 ± 4.18	t=16.18	<0.001*
Sleep medicine	0.20 ± 0.51	0.10 ± 0.29	Wilcoxon= 3.0	0.003*
Daytime dysfunction	2.59 ± 0.45	1.60 ± 0.92	Wilcoxon= 6.52	<0.001*
Global sleep quality score	8.62 ± 2.78	4.67 ± 1.59	Wilcoxon= 8.0	<0.001*

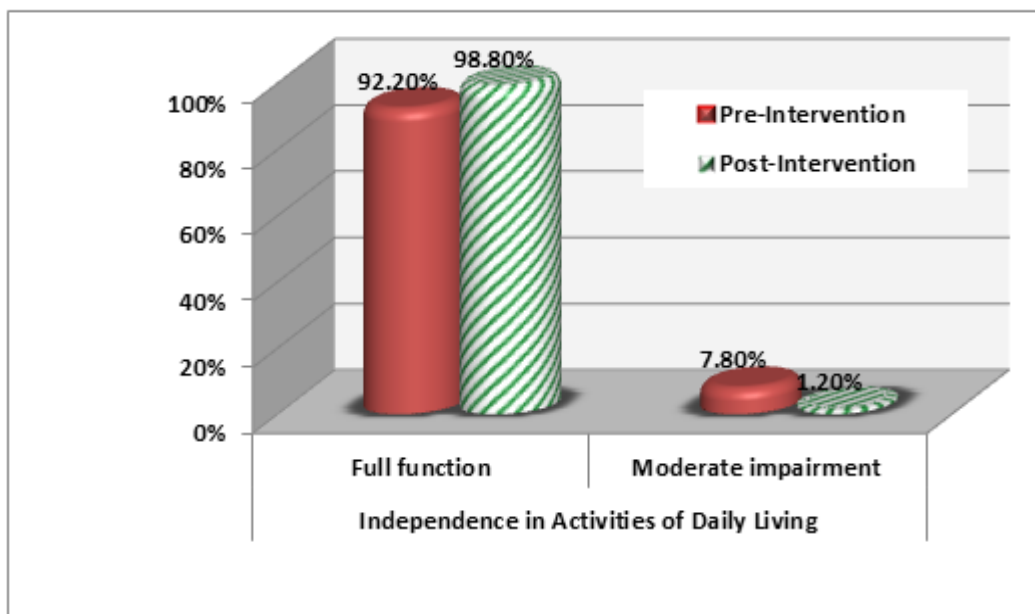


Figure (5): Distribution of independence in activities of daily living at pre and post intervention (n=84)

#### 4. DISCUSSION

Sleep disturbance and impairment in daily living activities are one of the earliest and stressful complaints among people living with Human Immunodeficiency Virus (PLWH), who are more likely to experience sleep disturbance symptoms than uninfected adults (Louis, 2012). Many studies found that most of PLWH have sleep disturbance and these disturbances arise at all phases of HIV disease. Increased sleep troubles put them at greater risk for cause mortality, negative health outcomes, HIV medication nonadherence, impairment in daily living activities and diminished quality of life. Thus, interventions to enhance sleep can have a significant positive influence on health outcomes for PLWH (Daniel et al., 2011).

Therefore, the current study was aimed to examine the effect of the behavioral nursing intervention for promoting sleep pattern and daily living activities among human immunodeficiency virus patients.

The present study illustrated that more than two-thirds of the study sample were males, while less than one-third of the study sample were females. The patients mean age was 34.58± 9.3 years. These findings were congruent with the report of Ferreira & Ceolim, (2012) who found that men were more than half of the study sample, while women were less than half of the study sample and the patient's mean age was 42.2 ± 9.0 years.

Regarding to sleep quality components which included subjective sleep quality, sleep duration, sleep latency sleep efficiency, sleep medicine, sleep disturbance and daytime dysfunction, the present study showed that more than half of the study sample reported their sleep quality as fairly good, while less than half of the sample reported that their sleep quality as fairly bad and very bad. This result was in concurrent with Cianflone et al., (2012) who performed a study to assess prevalence and reasons associated with sleep disturbances among early-treated HIV-infected persons in the USA. They found that about half of the study sample reported their sleep quality as fairly good, and about one-fourth of the study sample reported their sleep quality as fairly bad and very bad. Additionally, Salahuddin et al., (2010) who performed a study to define the relationships between daytime sleepiness, nighttime sleep quality, stressful life events, and HIV-related fatigue. They found that less than half of the study sample reported that their overall quality of sleep was fairly bad or very bad.

Concerning sleep latency, more than one-fourth of the study sample had long sleep latency from 31 to > 60 minutes. This study result was in accordance with Cianflone et al., (2012) who found that less than one-third of the study sample had sleep latency from 31 to >60 minutes. Also, this result was congruent with Lee et al., (2012) who performed a study to describe specific types of sleep problems in adults living with HIV/AIDS in California, USA. They found that one-third of the studied sample reported trouble falling asleep each night. Regarding sleep duration, more than one-fourth of the study sample reported sleeping of fewer than 7 hours per night. This result was in agreement with Cianflone et al., (2012) who found that less than half of the study sample reported sleeping of fewer than 7 hours per night. Additionally, Lee et al., (2012) who found that sleep duration in their study sample was less than 6 hours of sleep per night.

Relating sleep efficiency, the present study showed that more than one-third of the study sample had low sleep efficiency (< 85%). Also, this result was in accordance with Cianflone et al., (2012) who found that about one-third of the study sample had low sleep efficiency (< 85%). Furthermore, Salahuddin et al., (2010) who found that more than one-fourth of the sample reported that their sleep efficiency average less than 65%. Concerning sleep disturbance, the present study showed that about two-thirds of the study sample had sleep disturbance once or twice a week. This result was in agreement with Cianflone et al., (2012) who found that about two-thirds of the study sample had sleep disturbance less than once a week. Also, this study result was in accordance with Lee et al., (2012) who found that more than half of the sample reported disturbed sleep. Furthermore, Salahuddin et al., (2010) who found that two-thirds of the study sample reported sleep disturbance.

Relating use of sleep medication, the current study showed that about four percent of the study sample reported taking sleep medication for once or twice a week. This result was in accordance with Cianflone et al., (2012) who found that about seven percent of the study sample reported taking sleep medication for once or twice a week. On the contrary, Daneil et al., (2011) found that in terms of the use of sleep aides in USA, roughly more than one-third of HIV poor quality group in reported using sleep aids. Furthermore, Salahuddin et al., (2010) found that more than one-fourth of the study sample reported using sleep medications three or more times a week. These differences may be related to characteristics of the study sample. Regarding daytime dysfunction, more than one-fourth of the study sample reported having daytime dysfunction three or more times a week. This result was in accordance with Cianflone et al., (2012) who found that about one-fourth of the study sample reported daytime dysfunction from two to more than three times a week. Furthermore, Salahuddin et al., (2010) who found that more than one-third of the sample reported sleep-related daytime dysfunction.

Concerning sleep quality among the study sample, sleep troubles have been stated in many studies in HIV epidemic since early and have been believed to be higher in HIV-infected individuals in comparison to the HIV- negative population. The current study indicated that seventy-two percent of the HIV patients had sleep disturbance (score >5) using the PSQI scale. This result was in agreement with Salahuddin et al., (2010) who used the PSQI scale and found that most of the participants had scores > 5, indicating substantial sleep problems in the study group. Also, Taibi et al., (2014) who studied sleep quality and rest-activity patterns among PLWH in Washington, USA and reported that seventy-three percent of the study sample had sleep disturbance. Additionally, Santos et al., (2016) who examined the effect of the practice of physical activity on sleep of PLWH in Brazil reported that seventy percent of the population reported having problems related to sleeping disorders.

Regarding the prevalence of independence in activities of daily living using the Katz index scale, the present study revealed that the most of the study sample had reported full function in their daily living activities. These results were in

agreement with Laverick et al., (2017) who conducted a European study of cognitive function in HIV positive adult out patient's clinics in London, and United Kingdom to examine the weakness in everyday function, and cognitive function in people with HIV. They found that less than fourth of the study sample reported a decline in their activity of daily living. Also, the current study was in accordance with Flávio & Lucieni, (2015) who assessed the prevalence of neurocognitive illnesses and depression in a Brazilian HIV population using the independence of daily living scale. They found that more than two-thirds of the study sample were classified as independent in their daily living activities, while about one third were classified as partially dependent.

The current study displayed that there was a significant relationship among sex, social status, income sufficiency, the longevity of HIV infection and sleep quality. Regarding to social status, the present study revealed that married participants had good sleep compared to singles, divorced and widows. This result was in agreement with Huang et al., (2017) who studied the burden of sleep disturbances and associated risk factors among HIV infected persons on antiretroviral therapy across China. They found that there was a significant relationship between sleep quality and social status ( $P < 0.001$ ). Married individuals had a lower rate of sleep disturbance, potentially due to marriage conferring more family support, as it was shown that patients who reported support from family or friends consistently had a lower rate of poor sleep. Additionally, the present study showed that, participants with university education level had greater poor sleep quality compared with low educated participants (illiterate, primary & secondary), but no significant relation between educational level and sleep quality. This result was not agreed with Huang et al., (2017) who found that there was a significant association between the quality of sleep and education ( $P = 0.044$ ), as individuals with higher education had statistically high level of poor sleep compared with less educated. Regarding sex, there was a relationship between sleep quality and sex ( $P = 0.007$ ), as poor sleep quality was more prevalent in female than male. On the contrary, Huang et al., (2017) found that there was no a significant relationship between sleep quality and sex ( $P = 0.633$ ). This difference may be referred to characteristic differences of the study sample.

The present study showed that there was a significant negative correlation between the score of sleep quality using PSQI scale and the score of independence in activities of daily living using Katz index scale. When the global sleep score increase  $> 5$  (indicating poor sleep quality), the score of independence in activities of daily living decrease  $< 2$  (indicating dependency). That means poor sleep quality was associated with dependence in activities of daily living. This result was in accordance with Salahuddin et al., (2010) who studied the relationships between sleep quality at nighttime, sleepiness during the day, stressful events of the life, and fatigue caused by HIV among HIV patients in the USA. They found that poorer sleep quality at night was associated with fatigue-related impairment of functioning. The PSQI total was significantly correlated with fatigue-related impairment of functioning. Additionally, Cianflone et al., (2012) found that HIV-infected persons with insomnia were likely to have a decline in activities of daily living three times more than those without insomnia.

Regarding the effect of the behavioral nursing intervention on sleep quality at pre and post intervention, the current study revealed that hundred percent of the study sample who had reported poor sleep quality at pre-intervention decreased to forty-four percent at post-intervention with statistically significant change between pre and post-intervention. This result was in accordance with Hudson et al., (2008) who conducted a tailored sleep promotion intervention for promoting sleep disturbances in women with HIV in California. They found that the most study sample had a history of poor sleep, more than 5. Sleep variables had changed significantly before and after the intervention, the poorest sleep maintenance group had a significant enhancement compared with the good groups.

Regarding the mean score of sleep quality components at pre and post intervention, the present study showed that there was a significant modification between pre and post intervention on the matter of mean score of subjective sleep quality, habitual sleep efficiency, sleep latency, sleep duration, sleep disturbances, sleep medicine and daytime dysfunction. Regarding subjective sleep quality, the mean score was  $1.60 \pm 0.73$  at pre-intervention, and then significantly decreased to  $0.62 \pm 0.75$  at post-intervention. Additionally, the mean score of sleep latency significantly decreased from  $31.61 \pm 20.85$  minutes at pre-intervention to  $22.08 \pm 15.44$  minutes at post-intervention using PSQI scale. This result was in agreement with Hudson et al., (2008) who conducted a tailored sleep promotion intervention for promoting sleep disturbances in women with HIV in California. They found an improvement in sleep onset latency for the studied population from  $72 \pm 38.4$  minutes at pre-intervention to  $35 \pm 37.7$  minutes at post-intervention.

The present study showed that the mean score of sleep duration changed significantly from  $7.42 \pm 0.96$  hours at pre-intervention to  $8.10 \pm 0.90$  at post-intervention. These results were in agreement with Hudson et al., (2008) who found that the mean score of sleep duration among HIV patients in USA was  $5.9 \pm 1.93$  hours at pre-intervention compared to  $6.4 \pm 1.99$  hours at post-intervention. Also Weibel et al., (2013). They found that the mean score of sleep duration was  $5.5 \pm 2.1$  in the control group, compared to  $6.5 \pm 1.5$  in the intervention group. Related sleep efficiency, the present study showed that the mean score increased significantly from  $81.14 \pm 9.13\%$  at pre-intervention to  $85.10 \pm 7.54\%$  at post-intervention. This result was in accordance with Weibel et al., (2013) who found that the mean score of sleep efficiency improved in the intervention group compared to the control group. Additionally, this result was in accordance with Hudson et al., (2008) who found that the mean score of sleep efficiency at pre-intervention was  $71.9 \pm 15.7\%$  compared to  $72.7 \pm 18.7\%$  at post-intervention.

The current study showed that the mean score significantly decreased from  $17.15 \pm 4.74$  at pre-intervention to  $13.96 \pm 4.18$  at post-intervention. This result was in agreement with Hudson et al., (2008). They found that the mean score of sleep disturbance at pre-intervention was  $3.11 \pm 1.08$  compared to  $2.50 \pm 0.78$  at post-intervention. Concerning daytime dysfunction, the present study showed that the mean score of daytime dysfunction at pre-intervention significantly decreased from  $2.59 \pm 0.45$  to  $1.60 \pm 0.92$  at post-intervention. This result was in accordance with Weibel et al., (2013) who found that the mean score of sleep-related dysfunction had decreased in the intervention group compared to the control group.

## 5. CONCLUSION

Based on the results of the current study, it was concluded that:

Human immunodeficiency virus who received the behavioral nursing intervention had significantly improved sleep quality and sleep pattern compared to pre intervention. Also, there was a significant improvement in the level of independence in daily living activity at post-intervention, compared to pre-intervention. Additionally, there was a significant change between pre and post intervention regarding subjective sleep quality, habitual sleep efficiency, sleep disturbance, sleep latency and day-time dysfunction.

## 6. RECOMMENDATIONS

The following recommendations were suggested based on the results of this study:

- 1- Behavioral nursing intervention and awareness program about sleep promotion among HIV patients in outpatient and counselling clinics is needed.
- 2- Sleep quality should be regularly evaluated in HIV-infected people to identify the potential effect of sleep problems on antiretroviral therapy outcomes.
- 3- Information dissemination programs were recommended through mass media included establishing rules related to HIV mode of transmission by prohibiting illegal sexual behaviors.

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