ORIGINAL ARTICLE

The effect of cognitive behavioural therapy on job productivity level among health personnel with work-related insomnia at the Jos University Teaching Hospital, Nigeria

Stella C Uba,[1] Nanram B Longbap[2]

Abstract

Background: Insomnia, or sleeplessness, is a common sleep disorder affecting many health workers, particularly those with shifts that interfere with normal sleep patterns. This study assessed the effectiveness of Cognitive Behavioural Therapy (CBT) on job productivity among shift health workers experiencing work-related insomnia at Jos University Teaching Hospital (JUTH) in Plateau State, Nigeria.

Methodology: A prospective interventional study design was utilized, enrolling 60 shift workers suffering from work-related insomnia. Participants completed structured questionnaires to gather sociodemographic data, insomnia symptoms, and baseline job performance levels. Of these, 30 received CBT interventions, while the remaining 30 served as a control group. Job performance was later assessed using the Health Personnel Job Productivity Rating Scale (HPJPRS).

Results indicated that the intervention group experienced improved sleep duration, leading to a statistically significant increase in job performance by 56.7% compared to the control group ($p = 0.031$).

Conclusion: CBT effectively enhanced job performance among shift workers by improving their sleep quality, suggesting a strong link between improved sleep and increased productivity.

Keywords: Insomnia, Cognitive Behavioural Therapy, Work-Shift, Job Productivity.

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Introduction

Insomnia, defined as difficulty in initiating or maintaining sleep, or early morning awakening, is associated with impaired daytime functioning, for example, reduced cognitive performance, fatigue or mood disturbances.[1] It is an important public health problem that requires accurate diagnosis for effective treatment.[2] Sleep is an essential physiological function, necessary for neural development, learning and memory, emotional regulation, cardiovascular and metabolic function.[2,3] Quality sleep is necessary for good health and overall quality of life. Studies report that sleep-deprivation and circadian rhythm disruption may orchestrate altered immune function as well as an increased risk for cardiovascular disease and metabolic disorders such as weight gain, insulin resistance and diabetes. [2-4] It is believed that people with insomnia report a lower quality of life compared with people who sleep well.

Insomnia is a common complaint among health workers, especially those whose work hours overlap with the typical sleep period. Insomnia has pronounced effects on physical and mental status, as well as the work productivity of an individual. The true prevalence of insomnia is unknown because it is inconsistently reported in the scientific literature, due to different perceptions of insomnia amongst patients and clinicians.[5] The diagnosis of insomnia is primarily clinical and is most frequently based on the patient's history and sleep diaries.[8,9] Clinicians tend to emphasize the quantitative descriptions of insomnia, standard diagnostic criteria, rather than the patient's qualitative description and subjective experience of insomnia.[5,8,10] The high prevalence of insomnia and other sleep disorders, which are often underdiagnosed and undertreated, is a cause for global concern.[8]

Although the causes, symptoms and severity of insomnia are well documented[12], not much is known about work-related insomnia (distorted circadian cycle) among health workers who run calls and shift duties. The gap in the literature needs to be improved. The reported complications of insomnia include lower performance on the job, slowed reaction time, a higher risk of accidents, mental health disorders, such as depression, anxiety disorder or substance abuse, increased risk and severity of long-term diseases such as high blood pressure and heart disease.

This study analyzed the effect of cognitive behavioural therapy (CBT) on job productivity level among health personnel with insomnia at the Jos University Teaching Hospital (JUTH), Plateau State, Nigeria. The study aims to assess the baseline level of job productivity among health personnel with insomnia

[1]Department of Nursing Services, Jos University Teaching Hospital, Jos. Plateau State. [2]Department of Educational Foundations, Faculty of Education. University of Jos

All correspondences to:
Stella C Uba
Email: dukustell@gmail.com.

before exposure to CBT, evaluate changes in productivity afterward, and examine variations by gender, with specific objectives focused on establishing pre-CBT baselines and post-CBT evaluations.

Research Question: Does Cognitive Behavioural Therapy (CBT) improve job productivity among shift health workers with insomnia?

Null Hypothesis (H0): CBT has no effect on job productivity levels among shift health workers with insomnia. (Mean difference = 0)

Alternative Hypothesis (H1): CBT improves job productivity levels among shift health workers with insomnia. (Mean difference > 0)

Methodology

Study design: This was a prospective interventional study.

Setting: The study was conducted at the Jos University Teaching Hospital, a 674-bedded tertiary health facility located in the Middle-belt region of Nigeria.

Study Population: The population consisted of 200 health personnel who run shift duty or call, drawn from among doctors in surgical wards, Nurses in medical units, medical laboratory scientists/technicians and Pharmacists, who exhibited symptoms of work-related insomnia. Non-clinical personnel were excluded from the study i.e. records staff, attendants, accounts, security etc. because they do not have the clinical training with the core clinical values of the target population, work in a different work environment and cannot engage in clinical decisions.

Inclusion criteria: The recruited participants were health personnel who had work-related insomnia, due to shift/call duties, and who willingly gave informed consent to participate in the study.

Exclusion Criteria: Health personnel who had insomnia but were on medication for neurological and sleep disorders were excluded from the study.

Informed Consent: Only participants who gave informed consent were recruited for the study.

Sample Size: The sample size n= 60 was obtained using the proportion (30% Rule of Thumb) which is for small population less than 500 to ensure adequate representation. Total population (N) = 200, selected proportion = 30%. 200 x30/100=0.30 (30%), so that each of the four strata contributed 0.3 (30%) of its size to the sample size, n = 60. 30 each of control and intervention groups was assigned.

Sampling Technique: Stratified and simple randomization: the healthcare personnel in various departments were subjected to a baseline insomnia screening test using MAICL to determine those with work-related insomnia symptoms. 200 screening test questionnaires were given out to the participants, 186 were returned. Out of the 186 returned, 128 had moderate to severe insomnia. Participants were assessed for insomnia primarily when they were off- night shift or call to get a stable and comparable condition for baseline and follow-up and avoid exaggerating symptoms due to stress, workload, and sleep interruptions. Secondly, CBT targets maladaptive sleep thoughts and behaviours, which are best evaluated when the participant is in a normal sleep-wake context.

The workers with moderate to severe insomnia symptoms were proportionately stratified according to their departments in order to select group representatives. This was followed by the assigning participants into experimental and control groups using a simple random sampling method, whereby each participant was assigned a number. The participants were then arranged in descending order according to their assigned numbers; those with even numbers were assigned to the experimental group, while those with odd numbers were assigned to the control group.

Ethical Clearance: Ethical clearance from the Jos University Teaching Hospital's Ethics Committee was obtained before the study was undertaken with Reference number: JUTH/DCS/ADM/127/XXV/28.

Instruments for Data Collection: Two instruments were used for data collection: Manifestation of Insomnia Check List (MAICL) screening instrument and Health Personnel Job Productivity Rating Scale (HPJPRS). The instruments' content validities were sought through experts' judgements while the construct validities were determined using factor analysis. The reliability of internal consistency of the MAICL was established using the Cronbach-Alpha method with reliability coefficient Alpha of 0.89. The stability of the HPJPRS was established using the test-retest method. Data obtained from the two administrations were correlated using Pearson's Product Moment Correlation Coefficient Statistics to obtain the reliability index of 0.80.

The former assesses participants' insomnia symptoms, while the latter rates the job productivity levels of the health personnel. The Scoring and interpretation for MAICL were adopted from Silberman's Insomnia Measuring Instrument using the guidelines for Scoring and Interpretation by Clinical Practice Guidelines in Spanish NHS[13]. Total score ranged from 0-28. The respondents who scored between 15 and 28 were considered to meet the criteria for inclusion in the study because they were considered to have moderate to severe symptoms of work-related insomnia.

The adapted Health Personnel Job Productivity Rating Scale (HPJPRS) has 25 items rated on four-point scale (1-4) with two sections; A and B that considered demographic and level of job productivity data respectively. The highest score in the HPJPRS was 100% while the lowest was 25%. Job productivity was

categorized as high, moderate, and low. Health personnel whose scores were 76-100% were considered as having high job productivity, those with 51-75% were considered having moderate job productivity, while those scoring 25-50% were viewed as having low job productivity[16]

Methods and Procedure for Data Collection: Using the screening instrument, participants' eligibility for recruitment were established. On-the-spot administration and collection of the instrument was employed. The eligible participants were blindly randomized into experimental and control groups (30 each). Simple randomization was by using odd and even number-based selection process to assign the participants to the two groups. The two groups had a baseline assessment for job productivity using HPJPRS. The experimental group was then subjected to an intervention package tagged 'Cognitive Behavioural Therapy for Health Personnel with Insomnia' (CBTHPI) for six weeks (18 sessions). A post interventional assessment of the participants was made using the same instrument to determine the effect of the treatment. The data collected were analyzed using a generalized estimating equations model and IBM SPSS Version 18 (SPSS Inc., Chicago, IL, USA) statistical analysis software.

***Data Analysis*:**
The data obtained were analyzed using both descriptive and inferential statistics. Categorical variables were expressed as frequency counts, percentages, and contingency tables, while numerical (quantitative) variables were presented as means and standard deviation. The hypothesis was tested using a student t-test (Independent t-test) to compare the means between the two groups (intervention vs. control).

Results
Of the 60 participants, 32 (53.3%) were males and 28 (46.7%) were females. Their ages ranged between 21 and 65 years, with the majority, 12 (20.0%), aged between 51 and 55 years. Most (77.6%) of them had work experience of > 5 years. They exhibited common symptoms of insomnia, based on the mean symptom score of at least 2.5, which confirmed insomnia; the common features of insomnia in this study are listed in Table 1.

Table 1: Features of insomnia and their frequencies among health workers

S/N	STATEMENT	N	$\bar{\chi}$	SD
1.	I sometimes have trouble falling asleep.	60	2.70	1.11
2.	I sometimes have trouble falling back asleep whenever I am awakened at night, especially during a call or night shift.	60	3.21	1.21
3.	When I go to bed after the day's work, I can stay for about 30 minutes or more before initiating sleep.	60	2.44	1.22
4.	I sleep less than 7-8 hours for about 3 or more days in a week as a result of my work schedule.	60	2.84	1.22
5.	I usually wake up 3 times at night before daybreak to attend to patients.	60	2.74	1.02
6.	I feel that I wake up too early in the morning sometimes to meet work schedules.	60	3.00	1.21
7.	I do not have the same sleeping time and waking time every night as a result of my work schedule.	60	2.82	1.44
8.	I do not take naps during the day, even when I am tired.	60	2.94	1.10
9.	I am strict about the time of sleeping and waking up.	60	2.84	1.33
10.	I am irritable when I do not sleep well.	60	2.45	1.22
11.	Not sleeping well as a result of my work schedule usually makes me feel tired and have headaches.	60	2.54	1.00
12.	I feel anxious when I have little or no sleep.	60	2.70	1.11
13.	Sometimes I could lack concentration when at work if I do not sleep well.	60	2.84	1.22
14.	I feel a strong urge to take a nap during the day when I have little or no sleep.	60	2.82	1.44

In the experimental group, the pre-intervention job productivity level was rated as moderate in the majority, 16 (53.33%), high 12 (40.0%), and low 2 (6.7%). However, after the CBT, the productivity level improved-high 17 (56.66%), moderate 10 (33.33%), and low 3 (10.00%) as shown in Table 2a. The corresponding values in the control group are shown in Table 2b.

The mean response scores of respondents based on job efficiencies varied according to the profession-Table 3. The results showed clear differences between the pre-therapy and the post-therapy mean scores in their ratings of the level of job productivity.

Females had a mean productivity score of 31.12 ± 5.44 and a mean of 47.14 ± 7.21, before and after exposure to CBT, respectively, with a clear mean difference of 1.92 above those of their male counterparts (Table 4).

The difference between the experimental and control

Table 2 Effect of CBT on the Job Productivity of Health Personnel with Insomnia in the Experimental and Control Groups

	Job Productivity Level	Insomnia Mean Score Before treatment, n (%)	Insomnia Mean Score After treatment, n (%)	Insomnia Mean Score Difference
Intervention	High	12 (40.0)	17 (56.7)	5
Group	Moderate	16 (53.3)	10 (33.3)	6
	Low	2 (6.7)	3 (10.0)	1
	Total	30 (100.0)	30 (100.0)	12
Control	High	8 (26.7)	9 (30.0)	1
Group	Moderate	18 (60.0)	15 (50.0)	3
	Low	4 (13.3)	6 (20.0)	2
	Total	30 (100.0)	30 (100.0)	6

Table 3: Difference in the level of Job efficiency among different Health Personnel with Insomnia after CBT

Job Specification		Number	Mean Productivity Score	Productivity Score Standard Deviation	Productivity Score Mean Difference
Doctors:	Pretherapy	8	14.31	3.45	
	Post-therapy	8	18.74	5.33	4.43
Nurses:	Pretherapy	8	13.22	4.43	
	Post-therapy	8	17.14	5.16	3.92
Pharmacists:	Pretherapy	7	14.44	4.45	
	Post-therapy	7	19.43	5.62	4.99
Lab. Scientists:	Pretherapy	7	14.11	4.72	
	Post-therapy	7	18.27	5.77	4.16

Table 4: T-test to compare Job Productivity Mean Scores of Health Personnel with Insomnia in the Experimental and Control Groups Before the CBT

Groups	Number	Mean	SD	df	p-val.	Sig.	Decision
Control group	30	54.56	2.63	58	0.956	0.05	Retain *Ho*
Experimental group	30	54.16	2.75				

Table 5: The t-test to compare Posttest Job Productivity Mean Scores of Health Personnel with Insomnia in the Experimental and Control Groups After the CBT

Groups	Number	Mean	SD	Df	p-val.	Decision
Experimental group	30	62.21	6.21	58	.000	Reject Ho
Control group	30	54.57	7.64			

groups in their pretest job productivity mean score was tested using a t-test. The result is presented in Table 5. The study did not find any statistically significant difference between the experimental and control groups in the job productivity mean score before exposure to treatment.

Analysis of the difference between the experimental group and the control group in their posttest job productivity mean scores was tested using a t-test (Table 6). The result showed a statistically significant difference between the two groups in the job productivity mean score ($p<0.05$).

Discussion

The study findings show that most of the health personnel exhibited similar symptoms of insomnia which were outlined by Crosta to include; difficulty in falling asleep, including difficulty finding a comfortable

sleeping position, waking during the night and being unable to return to sleep, feeling not refreshed upon waking and daytime sleepiness, irritability or anxiety, as well as having problems concentrating and focusing on tasks.[19] The negative effect of insomnia on personnel's job productivity[20] was supported by the assertion of the study findings.

Cervena et al,[21] allude to the efficacy of cognitive behavioural therapy in insomnia. The improvement in job productivity after the CBT could be attributed to improved rest and sleep quality, which is in line with the suggestions of Benjamin[22] who opines that improving work performance, concentration and focus will depend on getting enough rest each night. The essence of taking a break (day[s] or leave) off work is to help the worker get refreshed and garner strength to perform better.

The study findings also affirm the effectiveness of CBT in the treatment of insomnia. This agrees with the findings of several authors,[24-27] which affirm the effectiveness of CBT in the treatment of insomnia as compared with other forms of interventions. Also, Hofmann, Asnaani, Vonk, Sawyer& Fang[30] opine that CBT for insomnia demonstrated superior efficacy as compared to other interventions for treating *insomnia* when examining sleep quality, total sleep time, waking time, and sleep efficiency outcomes. Consequently, it will be argued that CBT would be beneficial to health workers whose duty deny them adequate sleep.

The finding in this study suggests that insomnia hinders good job productivity. Studies have shown that insomnia has a negative effect on job productivity. Preidt[29] states that sleep disturbance causes clinically significant distress or impairment in social, occupational, educational, academic, behavioural, or other important areas of functioning. The fact that CBT clearly improved performance in this study attests to this claim. According to Bullock [28] the advantages of higher job productivity are to the individual, organisation, society and the nation as a whole contributes to the development of any economy and the living standard of the society as well. The present study also found that insomnia-related low job productivity is irrespective of gender which is in agreement with Anumaka's[8] position on gender and work productivity.

Limitation

The limitation of the study relates to small sample size, and the convenient sampling technique employed.

Conclusion

This study has revealed a hidden burden of insomnia among health workers. Cognitive behavioural therapy (CBT) does improve the productivity of insomnia sufferers by improving their sleep quality.

Recommendation

It is recommended that screening for work-related insomnia be included in routine medical check-ups and reinforcing employees' education on sleep hygiene be encouraged. Thus, providing CBT services in health facilities for staff who have insomnia should be encouraged for the general well-being of its workforce. Finally, a further well-structured multicenter study to review the duration of shift/call duty and its relationship with insomnia is worthwhile.

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