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Original Article

Association between Sleep Duration, Work Type, and Hypertension in a Nigerian Oil and Gas Company

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ABSTRACT:
Background: Researchers have speculated that there is an association between hypertension and short sleep duration (SSD) which has become a topic of great interest. This study investigated the association between sleep duration, work type, and hypertension in a Nigerian oil and gas company. Materials and Methods: The study was cross-sectional, done in oil and gas Company located in the South-south region of Nigeria. The 230 employees were randomly recruited from the phone directory and email address book to participate in the study using a questionnaire. The statistical analysis was done using SPSS version 21 with results presented as frequency/percentages. Results and Discussion: A substantial percentage (78.0%) of the study population worked in the daytime, while 22.0% reported working outside typical working hours (shift work), out of which 57.4% rotated between day and night shifts, and 42.6% reported rotating between morning, afternoon, and night shifts. In all, 11.2% of the participants slept for an average of 0 – 4 (but < 5) hours/night, 62.6% slept for 5 – 6 (but < 7) hours/night, and 26.2% slept for 7 – 9 hours/night. The overall proportion of participants with very good, fairly good, fairly bad, and very bad sleep quality was 39.4%, 52.8%, 6.5%, and 1.3% respectively. Conclusion: The sleep quality and work type were not significantly associated with the prevalence of hypertension among the oil workers

Keywords: Sleep duration, work type, hypertension, association.

1. INTRODUCTION

Hypertension is a long-term health condition in which the arterial blood pressure (BP) remains continuously high on a regular basis if the affected individuals do not take medications [1]. The global proportion of adults with hypertension is 25%, and it is projected to rise further to 29% by 2025 [2]. Hypertension is the leading predisposing factor for strokes, coronary heart diseases, kidney failure, and is the cause of deaths of 7.1 million persons yearly.[3]In Nigeria, there is a decline in the prevalence of infectious diseases; however, non-communicable diseases (NCDs) such as hypertension are increasingly becoming significant public health issues [4]. A report by the World Health Organization [5] reveals that Nigeria tops the list of countries in Africa with hypertension, where the prevalence ranges between 6.2% and 48.6% [6].

In recent years, the association between hypertension and short sleep duration (SSD) has become of great interest [7]. Sleep duration is the time interval between the beginning of sleep and arousal from it, excluding the periods of awakening during sleep. Although extensive studies regarding the association between SSD, sleep quality, and hypertension have been conducted, attention was focused on industrialized nations [8, 9]. There is a lack of data on sleep disturbances in Nigeria particularly among the oil and gas workers [10]. This study was done to examine the association between sleep duration, work type, and hypertension in a Nigerian oil and gas company.

2. MATERIALS AND METHODS

This research was a descriptive cross-sectional study (CSS) conducted between June and November 2018. The positivist approach was chosen because the researcher aimed at an objective measurement of the observations, and the collection of facts to improve existing knowledge, as well as the prediction of the effect of the exposures on the outcome [11]. In this design, a sample of the target population was randomly selected, and information was collected (using a questionnaire) to obtain a simultaneous estimation of the exposures, outcome (irrespective of the duration), and other general characteristics [12]. Thus, it was a suitable study strategy because it enabled the assessment of the prevalence

of exposures and the disease [13], which were part of the objectives of this study. Besides, the design enabled a description of the demographic and lifestyle characteristics of the study population, which are relevant for health policies in this organization [13, 14, 15].

However, this design has its limitations; and that is, an association does not necessarily mean causation [16]. Thus, CSS is less robust than other observational and interventional studies because one cannot dissociate determinants for the prevalence from predisposing factors for survival with the disease [16]. Hence, this study may suggest, but cannot conclude a causal association between short sleep duration (SSD), poor sleep quality, and the prevalence of hypertension because it is a one-time measurement of the variables [16]. Some of the disadvantages of the design are that it is more liable to a survival and selection bias as well as non-inclusion of other possible harmful effects of the exposures.

Study Population/Setting and Inclusion Criteria

The study setting was an oil and gas company located in the South-South region of Nigeria which carries out exploration, drilling, and the marketing of crude oil. The study population consisted of regular, direct, and labor contract staff within the organization. The population of workers in the area was obtained from the human resources representative. Thus, the organization has 1,488 eligible workers distributed in three primary locations namely district (585), onshore (605), and offshore (298). In the present study, respondents were selected from the three sites. The inclusion criteria for this study were that a participant must: 1) be a Nigerian 2) work in any of the locations in the South-south region of the organization 3) be aged between 26 and 59 years, and 4) can read and write in the English language.

Sample Size calculation and Sampling Method

The sample size used for the study was 230 which was calculated using the Fisher's Formula $n = \frac{Z^2 \times P(1-P)}{D^2}$ [17], where 'n' is the sample size, 'Z' the standard variation at 5% type 1 error ($p<0.05$), which is 1.96; P is the anticipated proportion of the condition in the country based on previous studies which was 15.9% prevalence of poor sleep quality among coal workers from a previous study reported by Lu et al. [7]d is the level of accuracy, usually determined by the investigator (in this study, it was set at 5% or 0.05). However, the sample size was increased by 10% to minimize non-response and improve the validity of results.

Since there were three different sites (district, offshore, and onshore), the total sample size was divided among these locations using a proportionate stratified random sampling [18, 19]. In this technique, a sampling fraction (n/N = sample size/population size = 230/1488 = 0.155) was calculated to obtain a size which is in proportion to the population size.[19]Subsequently, the sampling fraction was multiplied by the population of each stratum (site) to get the sample size required from each location [20] were needed to participate in the research from the district, offshore, and onshore sites respectively. Afterwards, to minimize selection bias and ensure that all the key and smallest subgroups were included in the sample, a stratified random sampling method was used to divide each stratum (site) into subgroups according to the various departments they were then employed in by the company, e.g., budget, logistics, maintenance, operations, and health/safety/environment (HSE), etc. After which, a simple random sampling was carried out using the company's telephone directory and official email address book to recruit individual participants to participate in the study [21]. Thus, the respondents consisted of engineers, geologists, health, security and safety personnel, administrators, and laborers, etc.

Data Collection

The majority of the sample population was identified through the company's telephone directory and official email address book. 230 employees were randomly selected from the phone directory and email address book and asked to voluntarily participate in the study by reading the participant consent form and filling out the attached questionnaire. The questionnaires were distributed through email (20% of respondents) and by approaching the workers (70% of respondents) one-on-one in their offices as well as through their supervisors (10% of respondents) particularly those who did not have email addresses [22].The names of the participants who submitted completed questionnaires through emails were documented to ensure that no worker responded twice. The consent form gave a brief description of the research study, the purpose, its benefits (such as increasing awareness on hypertension), and what the participation involved, as well as information on the freedom to opt out of the study at any time without affecting the doctor-patient relationship or any negative consequences [22, 23]. A self-administered close-ended questionnaire was adopted, which did not include any personally identifiable information such as the participant's name or signature. However, each questionnaire was numbered for easy identification after retrieval. The questions in the survey form were written with no medical terminology and tailored to the reader's level of understanding. The participants were given two weeks to fill out the survey forms to ensure privacy and enable them to record their average sleep duration per night with the aid of a sleep diary. Subsequently, each questionnaire was scrutinized to make sure that it was correctly completed. Survey forms that were returned incompletely filled in were eliminated to avoid inaccurate results [24].

Exposures and Outcome

In this study, there were three exposures, namely, short sleep duration (SSD), poor sleep quality, and shift work, whereas the outcome was hypertension. The duration of sleep was evaluated by the average self-reported number of hours of

sleep each night in the two weeks the survey covered. It is noteworthy that the participants were informed (in the consent form) that time spent awake in bed was not included in the sleep duration. Thus, sleep duration was obtained by the response to the question "what is your average number of hours of sleep per night in the past two (2) weeks?'' The three categories were (1) 0 - 4 (but less than 5) hours (2) 5 - 6 (but less than 7) hours, and (3) 7 – 9 hours. The reference value for sleep duration was chosen to be 7 – 9 hours, based on a previous study [25] and the National Sleep Foundation [26] recommendation which asserts that sleep duration of less than 7 hours for adults aged 26 – 64 years bestows a higher risk of mortality.

In this study, the quality of sleep was determined by the overall sleep quality (i.e., the depth and feeling of being well-rested). Thus, sleep quality was assessed by the response to the question "How would you rate your overall sleep quality?'' There were four categories of responses, which were: very good, fairly good, fairly bad, and very bad. Again, the reference category was a very good sleep quality. The question on the current work schedule was: "Do you work on a regular daytime schedule from 7.30 am – 5.00 pm?" Respondents who answered in the negative were classified as nights only, or rotating between day and night, or rotating between morning, afternoon, and night.

Hypertension was defined as the current use of medication/s for high BP, and it was evaluated by an affirmative response to the question "Are you currently taking any drug/s for high blood pressure (Hypertension)?'' A follow up open-ended question was asked to determine the duration (in years) of the use of antihypertensive drugs if the initial reply was in the affirmative.

The questionnaire was developed after carrying out a literature review on previous published articles and identifying exposures of interest. Also, a pilot study was carried out among some of the workers to assess and gain feedback on their opinions regarding the questions and the timing of the responses.[27] The questionnaire was self-administered and consisted of five parts, namely, the respondents' socio-demographic factors (age, gender, weight, height, educational background, job group, current department), health status, behavioral information (smoking, physical activity, alcohol consumption), work schedule, and sleep habits. Educational level was assessed by responses to the highest degree attained. Current job groups were divided into three classes in order of job status; junior, senior, and managerial. To determine smoking status, individuals were allocated to one of the following three groups; not a smoker, former smoker, or current smoker. Furthermore, the physical activity of respondents was categorized according to WHO [28] recommendations that people should engage in exercise for 150 minutes per week. Likewise, participants were grouped in accordance with their alcohol consumption in a week. Weight (in kg) and height (in cm) were self-reported to the nearest whole number, while the body mass index (BMI) was calculated as weight/height2 and recorded to the nearest 0.1kg/m2 [28]. Thus, overweight and obesity were defined as a value equal to or greater than 25.0kg/m2 and 30.0kg/m2 respectively.

Statistical Analysis

Data were entered, cleaned, and analyzed using SPSS version 21 for all statistical analyses. The continuous variables (age and BMI) were presented as mean (standard deviation, SD) and range, whereas the categorical variables (gender, social/behavioral, sleep duration, health status, work schedules, and sleep quality) were presented as frequency/percentages and bar charts. The Chi-Square was used to check the association between the categorical variables. The associations between SSD, sleep quality, shift work, and hypertension prevalence were examined using a bivariate logistic regression analysis, and calculating Odds Ratios (ORs) as well as 95% Confidence Intervals (CI). Furthermore, a multiple logistic regression model was employed to generate the adjusted odds ratios (aORs) to evaluate the above-mentioned relationships after adjustments for numerous confounding factors. Variables with significant levels $p<0.5$ from bivariate analyses were entered into a non-stepwise multivariate analysis model to control for any confounding influence. Hence, based on the existing pieces of literature regarding factors that may affect hypertension, this analysis was adjusted for age, BMI, smoking, duration of work employment, and job status. The two categories of bad (fairly bad and very bad) sleep quality were combined as poor sleep quality for the bivariate and multivariate analyses to make the tests more efficient. Likewise, the two groups of good (fairly good and very good) sleep quality were combined as good sleep quality. In the same vein, the three categories of average sleep duration were combined into two groups of short (less than 7 hours per night) and normal (7 – 9 hours per night). The significance, goodness-of-fit, and accuracy of the model were evaluated using the Hosmer-Lemeshow test and the classification table. For all the comparisons, the statistical significance was set at $P< 0.05$ (two-sided), and 95% confidence interval for the estimates is reported.

Ethical Considerations

Ethical approval for the study was obtained from the ethical review committee of the University of Roehampton, London, and a member of the management of the company was aware of the research project. Furthermore, participants were informed that returning a completed questionnaire was proof of consent.

3. RESULTS

A total of 219 participants returned the questionnaires; out of which one was excluded for being below the age of 26 years. Thus, a total of 218 respondents (out of a calculated sample size of 230) participated in this research, which amounted to a response rate of 94.8%. The socio-demographic factors, and the work-related characteristics of the study population

are represented in Tables 1. The age group 43 – 50 years had the largest proportion (96; 47.8%) of participants. Thus, the mean age was 44.6 (range 26 years – 59 years, SD = 5.8). There were 176 males (81.9%) and 39 females (18.1%), with an M: F ratio of 4.5:1.0. A substantial percentage of the participants (185; 86.4%) attained a university degree. The mean BMI was 29.4 kg/m2 (range 17.4 kg/m2 – 48.5 kg/m2, SD = 5.1); however, only 31 persons (17.2%) had a BMI that was within the normal range. Furthermore, the majority (169; 78.6%) of the participants never smoked, and only a few respondents (5; 2.4%) were involved in high-risk alcohol drinking. Also, only 55 (25.9%) of the participants engaged in the CDC's [29] recommended frequency/duration of physical exercise, and a considerable portion (158; 74.9%) belonged to the senior job group category. The duration (in years) of working in the organization ranged from 1 – 35 years; nonetheless, about half of the study population (108; 51.2%) had worked for between 11 – 20 years.

A substantial percentage (167, 78.0%) of the study population worked in the daytime, while 47 persons (22.0%) reported working outside typical working hours (shift work), out of which 27; 57.4% rotated between day and night shifts. In all, 134 persons (62.6%) slept for 5 – 6 (but < 7) hours/night. The overall proportion of participants with very good, and fairly good sleep quality was 39.4% (85 persons), and 52.8% (114 persons), respectively. This information is shown in table 2. The prevalence of self-reported hypertension in the study population was 27.8% representing 60 persons.

The association between SSD, sleep quality, shift duty and hypertension prevalence was examined using a bivariate logistic regression, and the p value was obtained using the Chi-Square statistics.[30] The results are presented in Tables 3 and 4. Concerning the demographics and lifestyle variables, except for smoking status (p= 0.01, OR= 2.26, 95% CI: 1.15 – 4.50), no association was observed with hypertension. Similarly, there was no difference found between proportion of hypertensive and non-hypertensive participants distributed among the categories of average sleep duration, overall sleep quality work schedule and the different categories of shift duty.

A multiple logistic regression model was utilized to obtain the adjusted odds ratios because the outcome variable (hypertension) is binary. The predictor variables (average hours of sleep/night, overall sleep quality, and shift work) and the confounding variables (age, BMI, smoking, duration of work employment, and job group status) were entered into the model because the latter variables are possible risk factors of the disease, and so may influence the results.[31] The results are presented in Table 5. After adjustments for the above-mentioned potential confounders, there was no significant relationship between shift work (p=0.29, aOR 3.71, 95% CI. 0.32 – 42.57) and hypertension sleep quality (p= 0.22, aOR 33.89, 95% CI. 0.12 - 105.02) and hypertension.

Table 1: Socio-demographic characteristics of the study population

Variables	Frequency	Percentage (%)
Age (n=201)		
26 – 33 years	6	3.0
34 – 42 years	70	34.8
43 – 50 years	96	47.8
51 – 59 years	29	14.4
Gender (n=215)		
Male	176	81.9
Female	39	18.1
Educational level (n=214)		
Primary	1	0.5
Secondary	16	7.5
Technical	12	5.6
University	185	86.4
BMI (kg/m^2) (n=181)		
Normal (18.5 - 24.9)	31	17.2
Overweight (25.0-29.9)	75	41.4
Obese (≥30.0)	75	41.4
Smoking status (n=215)		
Never	169	78.6
Former	38	17.7
Current	8	3.7
Alcohol intake/week (n=212)		
None	125	59
1 – 14 drinks	82	38.7
≥15 drinks	5	2.3
Physical activities/week (n=212)		
None	37	17.5
1 – 3 times	120	56.6
≥4 times	55	25.9
Job category (211)		
Junior	38	18
Senior	158	74.9
Management	15	7.1
Duration of years in employment (n=211)		
≤10 years	56	26.5
11 – 20 years	108	51.3
21 – 30 years	45	21.3
>30 years	2	0.9

Table 2: Distribution of variables related to work/sleep status among the respondents

Variables	Frequency	Percentage (%)
Work Schedule		
Daytime work	167	78.0
Shift Work	47	22.0
Shift duty timing among respondents engaged in shift work		
Day and night rotation	27	57.4
Morning, afternoon and night rotation	20	42.6
Average hours of sleep per night		
0 – 4 hours (but less than hours)	524	11.2
5 – 6 hours (but less than hours)	7134	62.6
7 – 9 hours	56	26.2
Overall sleep quality		
Very bad	3	1.3
Fairly bad	14	6.5
Fairly good	114	52.8
Very good	85	39.4

Table 3: Distribution of hypertension among the respondents

Hypertension	Frequency	Percentage (95% Confidence Interval)
Yes	60	27.8% (22.1% – 34.0%)
No	156	72.2% (65.9% – 77.9%)

Table 4: Bivariate analyses of demographics/social habits of respondents and hypertension

Variable	All	Hypertensive status: Hypertension Number (%)	Hypertensive status: No hypertension Number (%)	Crude Odds Ratio (95% CI)	p-value
Age (years)					
26 – 42**	76	15 (19.7)	61 (80.3)	1	
43 – 59	125	36 (28.8)	89 (71.2)	1.65 (0.830.15 – 3.26)	
Gender					
Male**	176	49 (27.8)	127 (72.2)	1	
Female	39	10 (25.6)	29 (74.4)	0.89 (0.410.78 – 1.97)	
Educational level					
Secondary &lower**	17	5 (29.4)	12 (70.6)	1	
Above secondary	197	54 (27.4)	143 (72.6)	0.91 (0.311.00 – 2.69)	
BMI (kg/m^2)					
Normal (18.5 - 24.9)**	31	5 (16.1)	26 (83.9)	1	
Overweight/ obese (≥25.0)	150	42 (28.0)	108 (72.0)	2.02 (0.730.17 – 5.62)	
Smoking history					
No**	169	40 (23.7)	129 (76.3)	1	
Yes	46	19 (39.5)	27 (60.5)	2.26 (1.150.01* – 4.50)	
Alcohol intake					
None**	125	39 (31.2)	86 (68.8)	1	
1-14 drinks/week	82	20 (24.4)	62 (75.6)	0.71 (0.380.14 – 1.34)	
15 or more drinks/week	5	1 (20.0)	4 (80.0)	0.55 (0.590.59 – 5.09)	
Physical Activity					
None**	37	11 (29.7)	26 (70.3)	1	
1-3 times/week	120	36 (30.0)	84 (70.0)	1.03 (0.450.98 – 2.27)	
4 or more times/week	55	11 (20.0)	44 (80.0)	0.59 (0.220.28 – 1.55)	

CI-Confidence interval **Statistically significant* **Reference category

Table 5: Bivariate analyses of factors related to work/sleep status and hypertension

Variable	All	Hypertensive status: Hypertension Number (%)	Hypertensive status: No hypertension Number (%)	Crude Odds Ratio (95% CI)	p-value
Job group					
Junior**	38	7 (18.4)	31 (81.5)	1	
Senior	158	48 (30.4)	110 (69.6)	1.93 (0.810.070 – 5.02)	
Management	15	3 (20.0)	12 (80.0)	1.10 (0.250.447 – 4.99)	
Duration of years in employment					
≤10 years**	56	11 (19.6)	45 (80.4)	1	
11 – 20 years	108	30 (27.8)	78 (72.2)	1.57 (0.720.127 –3.44)	
21 – 30 years	45	14 (31.1)	31 (68.9)	1.85 (0.740.184 –4.60)	
>30 years	2	2 (100.0)	0 (0.0)	***	0.047*
Work schedule					
Daytime work**	167	43 (25.7)	124 (74.3)	1	
Shift work	47	16 (34.0)	31 (66.0)	1.49 (0.730.261 – 2.97)	
Shift duty timing among respondents on shift Schedule					
Day and night rotation**	27	8 (29.6)	19 (70.4)	1	
Morning, afternoon and night rotation	20	8 (40.0)	12 (60.0)	1.58 (0.47-0.458 5.35)	
Average sleep duration					
Short(<7 hours/night)**	158	42 (26.6)	116 (73.4)	1	
Normal (7-9 hours/night)	56	18 (32.1)	38 (67.9)	1.31 (0.670.426 – 2.54)	
Overall Sleep Quality:					
Good**	199	53 (26.6)	146 (73.4)	1	
Poor	17	7 (41.2)	10 (58.8)	1.93 (0.700.257 – 5.33)	

CI-Confidence interval **Statistically significant* **Reference category
***Odds ratio not calculated because of the presence of zero

Table 6: Multivariate analysis of factors related to hypertension

Variable	Coefficient	Adjusted Odds Ratio	95% CI	p-value
Age category (years)				
43 – 59	1.899	6.67	0.85 – 62.50	0.13
26 – 42		Reference		
BMI category				
Overweight/obese	2.281	9.79	0.07 – 95.02	0.45
Normal		Reference		
Smoking history				
Yes	0.855	2.35	0.13 – 45.02	0.57
No		Reference		
Job group				
Management level	1.926	6.83	0.40 – 12.50	0.18
Non-management level (junior/senior)		Reference		
Duration of work employment				
>10 years	3.09	21.94	1.13 – 437.94	0.04*
≤10 years		Reference		
Work Schedule				
Shift work	1.312	3.71	0.32 – 42.57	0.29
Daytime work		Reference		
Average sleep duration				
Short (<7 hours/night)	0.721	2.06	0.16 – 25.39	0.57
Normal (7-9 hours/night)		Reference		
Overall Sleep Quality				
Poor	3.523	33.89	0.12 – 105.02	0.22
Good		Reference		
Constant	3.442	31.26		0.39

CI-Confidence interval **Statistically significant*

4. DISCUSSION

This study showed that majority of participants slept for less than seven hours. This finding reflects the downward trend in the global average sleep duration, [32] and is in line with recent studies by Ceide *et al* [33] and Carnethon *et al*. [34] who suggested that blacks are more likely to experience shorter sleep durations in comparison with other races. Again, the overall prevalence of poor sleep quality (fairly bad and very bad) was low. This finding was much lower than that of Shittu *et al.*[35] and Alebiosu *et al.*[36] who reported 44% and 42.4% respectively while investigating sleep quality in tertiary hospitals in South-west Nigeria. The

higher proportions in the latter studies were probably due to the low socioeconomic and poor health status as well as the attendant sleep-related disorders among the respondents. Nonetheless, the results of the present study demonstrated that poor sleep quality was not significantly associated with the prevalence of hypertension; which is in agreement with a study by Alebiosu *et al* [36].

Studies have revealed that individuals who sleep for shorter durations were at a higher risk of developing hypertension, especially those below the age of 60 years [40, 41]. Similarly, several published articles have suggested that shift workers were prone to develop hypertension [42, 43]. However, the fourth finding in this research showed that before and after controlling for confounders, there was no association between short sleep duration of < 7 hours per night and hypertension. Although this result agrees with a few past studies [44, 45] on the relationship between SSD and the prevalence of hypertension, it is contradictory to the findings in much of the literature. One could aver that several factors could be responsible for the heterogeneity of findings from most of the previously published research. One of which is that it is common to see individuals with undiagnosed high BP in Nigeria due to a lack of knowledge and education concerning health-related issues. It should be noted that specific categories of workers in this organization do not have access to the healthcare services in the company's clinic. Another explanation may be that some were hypertensive, but were not using the drugs prescribed (as the case definition of hypertension in this research was the current use of anti-hypertensive drugs). This challenge is made worse by the absence of health insurance coverage and the inability of some workers to afford BP medications, which in turn, leads to poor drug compliance.

Another probable reason for the conflicting result might have been that due to inaccessibility to the company's clinic, many of the employees patronized unqualified health personnel who frequently under-diagnosed hypertension [46]. Besides, Nigerians usually go to hospital when they are ill rather than for regular health checks, and they would choose to spend money on expensive clothes and cars in preference to health screening. Thus, one can speculate that many of the participants in this present study might not have been aware of their health status [47]. Moreover, several studies [48, 49, 50] affirm that women with SSD (particularly <5 hours/night) were more likely to develop hypertension compared to men. Therefore, it is possible that another reason for the absence of association between these variables existed because there were more men than women in this study.

In addition, there was no significant relationship between shift work and the prevalence of hypertension before and after adjustments for potential confounders. Although there are many hypotheses regarding pathophysiological pathways and their association between shift work and hypertension, more intervention studies are necessary to determine the underlying mechanisms in developing countries [51]. One of such theories suggests that shift work is a stressful condition which impairs the body's system and results in the development of hypertension [51]. The apparently inconsistent findings in this study could also be attributed to the ability of the workers (especially shift workers) to cope with or adapt to the resulting occupational stress, which explains the absence of any impact on BP. Additionally, the lack of association may be due to the healthy worker effect proposed by Esquirol *et al*. [52], in which workers who experienced deterioration in their general health may have been re-assigned to daytime work. Besides, the shift workers in this organization usually have a period of rest before and after a rotation of shift work. Thus, the absence of an association between shift work and high BP in this present study could also be related to sleep compensation and recovery, which are beneficial [53]. Although the duration of years in employment was examined, the length of years in shift work was not evaluated in the questionnaire for this research. Therefore, it is also probable that the duration of shift work could have influenced the findings in the present study. A study by Yeom *et al*.[40] on 1,953 male adult workers in a petrochemical company in South Korea supports this proposition (which is of public health importance) by demonstrating an increased prevalence of hypertension and a higher odds ratio in participants who worked in shifts for more than 20 years.

5. CONCLUSION

It was observed that poor sleep quality was not significantly associated with the prevalence of hypertension. Also, compared to sleeping for 7-9 hours per night, there was no relationship found between short sleep duration of < 7 hours per night and hypertension prevalence. Thus, the implication for public health practice is that sleep guidelines are necessary in Nigeria, which should be based on the population's average sleep duration and what is considered normal for a specific setting irrespective of differences in socio-cultural and environmental characteristics [38]. Notwithstanding, prospective studies with larger sample sizes are necessary to assess and understand sleep patterns (using actigraphy or polysomnography), as well as to determine their influence on BP among individuals in developing countries.

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