**Study of Sleep Disorders Among Healthcare Professionals in Tropical Environments : Prevalence and Determining Factors Summary**

Abstract

**INTRODUCTION**: Sleep is one of man's primary needs. The quality of sleep improves well-being and consequently the performance of humans in their various activities. The aim of this study was to evaluate the prevalence and determining factors of sleep disorders among health professionals.

**METHODOLOGY**: This was a descriptive and analytical cross-sectional study which took place from 14 January to 09 March 2020 and involved questionnaires administered to 402 consenting healthcare professionals. Our study included healthcare professionals at CHU-B who were present at their place of work during the study period. Pittsburg sleep quality index (PSQI) enabled us to assess sleep quality among healthcare professionals

**RESULTS:** A total of 402 of the 505 healthcare professionals at CHU-Bogodogo were registered during the study. The mean age was 39.2 ± 7.1 years. The sex ratio was 0.93. According to the Pittsburg sleep quality index (PSQI), 193 healthcare professionals had a sleep disorder, i.e. a prevalence of 52.45%, with a female predominance of 53.88%. In this study, 36.78% of healthcare professionals suffered from insomnia, 28.49% of which was insomnia on falling asleep. The components of the PSQI most affected in order of severity were: sleep duration, sleep latency and poor form during the day, with respectively 67.87% of healthcare professionals with sleep disorders sleeping less than 7 hours per night, 35.75% usually taking more than 30 minutes to fall asleep and 24.35% being in fairly poor form during the day. The factors determining the onset of sleep disorders were: professional stress and the use of sleep medication, which respectively affected 63.73% and 11.39% of healthcare professionals with sleep disorders.

CONCLUSION: sleep disorders were present in more than half the healthcare professionals at CHU-B. The challenge for these sensitive healthcare professionals is to combine professional constraints with the necessary conditions for restful sleep.

KEYWORDS: Sleep disorders, Healthcare professionals, PSQI, Tropical Environments

INTRODUCTION

Sleep is a natural state of loss of awareness of the outside world, reduced muscle tension and inhibition of environmental stimuli. Sleep disorders can have physiological, environmental or behavioural causes. Sleep is an important part of human life, as it is an integral part of physiological functioning**[1]**. This is the time when the brain's activities process the day's acquisitions, while facilitating the consolidation of information in long-term memory **[2].** It is an essential requirement for good health, just like nutrition and sport. Good quality sleep is characterised by falling asleep in less than an hour, waking up less than twice a night, falling asleep again in less than 30 minutes and waking up in the morning feeling well rested for the day**[3].** People have very different sleep requirements, generally between 6 and 10 hours a night. Most people sleep through the night. However, many people are forced to sleep during the day because of their work schedules, a situation that can lead to sleep disorders. Sleep disorders are among the most common clinical problems. With the growing level of public awareness of sleep health and sleep disorders, sleep-related concerns are becoming an increasingly important component of the practice of both general internal and specialty medicine. It is estimated that 40 million Americans are chronically ill due to sleep disorders, and an additional 20 to 30 million Americans experience intermittent sleep-related difficulties that mirror some common sleep disorder symptoms.3,4 However, a survey of more than 400 medical schools across the world showed that schools provide 2.5 hours of education on sleep on average, and 27% of the schools reported providing no sleep medicine instruction **[4]** As a result, many physicians are without the tools to identify sleep disorders and support their patients in efforts to seek appropriate evaluation and care. There are more than 90 recognized sleep disorders, many of which are comorbid with other medical conditions.

Sleep is an important modifiable lifestyle factor that can improve daily cognition and possibly reduce the risk of developing dementia (aayushi). **[5]**. Sleep disorders are a frequent but under-diagnosed complaint in medical practice **[6]**. Sleep quality can be influenced by a number of factors, such as age, level of excitement or emotional charge, diet, use of certain medications, etc. Some professional activities can also have a negative impact on sleep quality. For example, the health sector, with its associated stress and mental workload, is cited as a source of sleep disorders **[4]**. Despite the well-known association between sleep disorders and more serious health problems, there is still little literature on this subject in Africa. In Burkina Faso, there have been no studies to date of sleep disorders among healthcare professionals. The aim of this study is to investigate the prevalence and determining factors of sleep disorders among healthcare professionals at the Bogodogo University Hospital Center.

**PATIENTS AND METHOD**

This was a descriptive and analytical cross-sectional study which took place from 14 January to 09 March 2020 in the various departments of the Bogodogo University Hospital Center in Ouagadougou, Burkina Faso. All male and female health professionals at Bogodogo University Hospital Center who gave informed consent and were present at work during the study period were included in our study. Socio-demographic characteristics (sex, age, marital status, profession, level of education, place of residence), socio-professional characteristics (number of years of service, occupational stress, department, number of shifts per month, regularity or variability of usual working hours, usual working shift), clinical characteristics and lifestyle habits (use of sleep medication, family history of sleep disorders, etc.) were taken into account,

The variables analysed (e.g. personal history of sleep disorders, personal history of chronic illnesses, consumption of coffee or tea in the evening, existence of nocturnal noise disturbance in the environment that disrupts sleep) and the Pittsburg Sleep Quality Index (PSQI) were analysed. The chi-square test or Fisher's exact test were used to compare categorical variables where necessary. The alpha significance level was 0.05.

The Pittsburg sleep quality index (PSQI). The score ranges from 0 to 21, with a score less than or equal to 5 indicating good sleep quality and a score greater than 5 indicating poor sleep quality **[7]**.

**Inclusion criteria**

All male and female healthcare professionals at CHU-B who gave informed consent and who were present at their place of work during the study period.

**Non-inclusion criteria**

* Healthcare professionals who did not consent to participate in the study;
* Healthcare professionals who did not fully and correctly complete the data collection form.

**DATA COLLECTION AND ANALYSIS**

Data collection tools

Data were collected by providing each participant with an information note, an informed consent form and a self-completed questionnaire. Explanations and clarifications were provided to healthcare professionals who requested assistance in understanding the items and filling in the questionnaire. The forms were often collected on the spot on the same day or the following days. The maximum return time was one week. Each self-administered questionnaire was then examined to ensure that it had been completed correctly.

Four hundred and two (402) healthcare professionals were surveyed using an individual and anonymous data collection form consisting of two parts:

* a first part dealing with the socio-demographic, and socio-professional variables previously defined.
* a second part reserved for the validated French version of the Pittsburg sleep quality index (PSQI) which is a questionnaire used to determine sleep quality and to search for sleep disorders. It was designed to assess different aspects of sleep quality over the previous month using a questionnaire. The questions are grouped into 7 components : sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disorders, use of sleep medication and daytime sleepiness. The score ranges from 0 to 21, with a score less than or equal to 5 indicating good sleep quality and a score greater than 5 indicating poor sleep quality **[7]**.

**Data processing and analysis**

The data collected were entered on a microcomputer and analysed using epi-info software version 7.2.1.0. Tables and figures were produced using Microsoft Excel 2016. The chi-square test or Fisher's exact test was used to compare categorical variables where necessary. The alpha significance level is 0.05.

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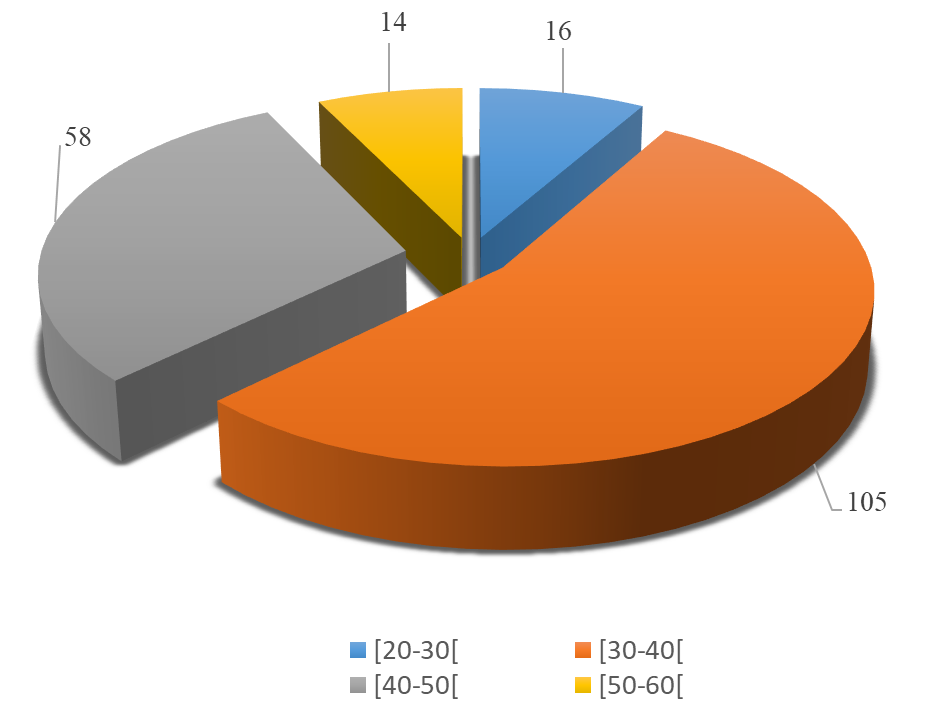
**RESULTS**

During the study period, out of a total of 505 healthcare professionals at the CHU-B at the time of the survey, 402 healthcare professionals took part, i.e. a participation rate of 79.60%. Of these 402 healthcare professionals, 368 met our inclusion criteria. The proportion of respondents was therefore 91.54%.

**Epidemiological characteristics**

The average age of the healthcare professionals at CHU-B was 39.2 years, with extremes of 26 and 59 years. There were 190 women (51.63%) and 178 men (48.37%), giving a sex ratio of 0.93.

Of the 368 healthcare professionals, 193 had sleep disorders, i.e. a PSQI score greater than 5, giving a prevalence of 52.45% of sleep disorders among healthcare professionals at CHU-B. Women were most affected in 53.88% of cases (104 women) and men in 46.11% of cases (89 men). Of the healthcare professionals with sleep disorders, 105 were aged between 30 and 40 and 14 were over 50. Figure 1 shows distribution of health professionals with sleep disorders according to age group.



**Figure 1** : Distribution of health professionals with sleep disorders according to age group.

**Professional categories**

Of the healthcare professionals with sleep disorders, 30.05% were doctors and 26.95% were nurses.Table 1 shows the distribution of healthcare professionals with sleep disorders according to their profession.

**Table 1**: Distribution of healthcare professionals with sleep disorders according to their profession.

|  |  |  |
| --- | --- | --- |
| **Profession** | **Number** | **Percentage%** |
| State-qualified manipulator  in medical electroradiology | 01 | O,51 |
| Pharmacy assistant󠇥 | O2 | 01,03 |
| Dental surgeon󠇥 | O3 | 01,55 |
| Hospital pharmacy assistant󠇥 | O2 | 01,03 |
| State-qualified midwife/maïeutician󠇯 | 31 | 16,06 |
| Pharmacist󠇥(ne) | 03 | 01,55 |
| Biomedical technologist | 04 | 02,07 |
| Biologiste médical | 03 | 01,55 |
| Hall boy/girl | 13 | 06,75 |
| Nurse 󠇥 | 52 | 26,95 |
| Doctor | 58 | 30,05 |
| Health Assistant | 21 | 10,9 |
| Total | 192 | 100,0 |

Of the healthcare professionals with sleep disorders, 19.2% practised in gynaecology and reproductive medicine and 12.1% in anaesthesia/intensive care.

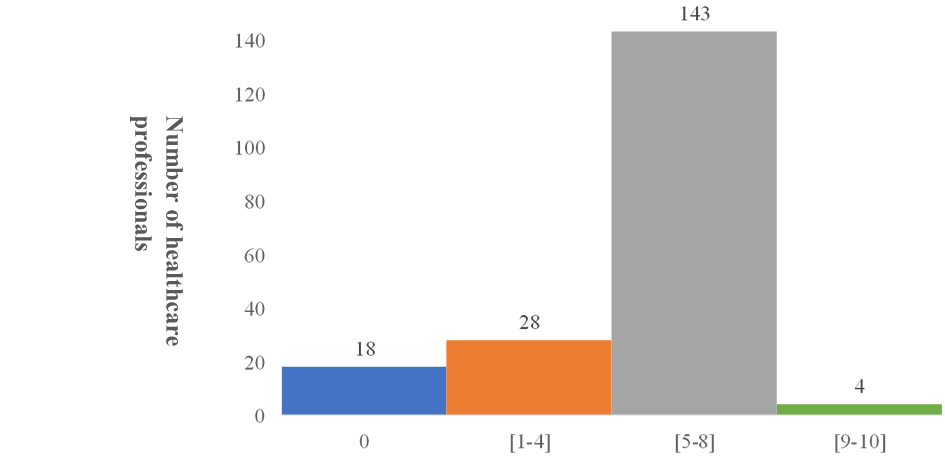
Table 2 shows the distribution of healthcare professionals with sleep disorders according to their department of practice.

Table 2: Breakdown of healthcare professionals with sleep disorders according to their department of practice

|  |  |  |
| --- | --- | --- |
| **Exercise department** | Number | Percentage% |
| Internal Medicine | 05 | 02,65 |
| Stomatology and maxillofacial surgery | 08 | 04,16 |
| Nephrology/Hemodialysis | 03 | 01,65 |
| Neurology | 04 | 02,1 |
| Orthopaedics and traumatology | 10 | 05,2 |
| Laboratory | 11 | 05,7 |
| Surgical emergencies | 09 | 04,8 |
| Medical emergencies | 12 | 06,3 |
| ENT and cervico-facial surgery | 02 | 01,1 |
| Ophthalmology and visual exploration | 04 | 02,1 |
| Cardiology | 10 | 05,2 |
| Paediatrics | 17 | 08,8 |
| Gynaecology and reproductive medicine | 37 | 19,2 |
| Anaesthesia/Resuscitation | 25 | 12,1 |
| Rheumatology | 11 | 05,7 |
| Medical imaging and radiology | 08 | 04,18 |
| Hospital pharmacy | 07 | 03,66 |
| Anatomy and pathology | 01 | 0,55 |
| Histo-embryology and reproductive biology | 01 | 0,55 |
| Forensic medicine | 0 | 0 |
| Dental surgery | 04 | 02,1 |
| Physical and rehabilitation medicine | 02 | 0,55 |
| Oncology and clinical haematology | 03 | 1,65 |
| Total | 193 |  |

Of the healthcare professionals with sleep disorders, 143 worked an average of 6 shifts per month and 18 did not work any shifts per month.

Figure 2 shows the distribution of healthcare professionals with sleep disorders according to their number of shifts per month.



**Number of shifts/month**

**Figure 2 :** Distribution of healthcare professionals with sleep disorders according to their number of shifts per month (n=193).

**Clinical aspects**

Out of 193 healthcare professionals with sleep problems, 122 (63.21%) claimed to have occupational stress.Of the healthcare professionals with sleep problems, 11.39% took medication to help them sleep at night and 18.13% experienced noise pollution in their environment.

Table 3 shows the distribution of healthcare professionals with sleep problems according to their lifestyle habits.

**Table 3** : Breakdown of healthcare professionals with sleep disorders according to their lifestyle habits.

|  |  |  |
| --- | --- | --- |
| Lifestyle | Number | Percentage % |
| Taking sleeping pills | 22 | 11,35 |
| Sleep disturbance | 29 | 15,02 |
| Chronic illness | 28 | 14,02 |
| Sleep disturbance/family | 29 | 15,02 |
| Coffee or tea in the evening | 67 | 34,71 |
| Noise disturbance  in the environment | 35 | 18 ,13 |

**Component 1** : Subjective quality of sleep

The subjective quality of sleep was perceived by healthcare professionals as :

- 81.25% felt it was ‘fairly good to very good

- fairly bad to very bad’ for 18.75%, and

- very poor’ for 6.3%.

**Component 2** : Sleep latency

* Among the healthcare professionals surveyed, the average time taken to fall asleep was estimated at 33 minutes, with extremes of 2 minutes and 4 hours. Thus :

- 51.29% fell asleep in 30 minutes or less;

- 35.75% usually took more than 30 minutes to fall asleep

lso, 28.49% of healthcare professionals were unable to fall asleep in less than 30 minutes 3 or 4 times a week.

* Among healthcare professionals with sleep problems :

- 36.78% had moderate difficulty falling asleep

- 29.01% had major difficulties falling asleep.

**Component 3** : Sleep duration

* For all healthcare professionals surveyed,

- The average time spent in bed for all healthcare professionals surveyed was 6.51 hours, with extremes ranging from 4 to 10 hours.

- actual sleep time averaged 5.78 hours, with extremes of 3 and 9 hours.

- 56.25% of healthcare professionals slept less than 7 hours a night.

* For healthcare professionals with sleep disorders, the average time spent in bed was 6.21 hours, with extremes of 4 and 9 hours.

- 67.87% slept less than 7 hours a night.

- 31.08% had less than 5 hours of effective sleep per night.- 12.95% took more than 60 minutes to fall asleep.

**Component 4** : Habitual sleep efficiency

Among healthcare professionals with sleep disorders :

- 27.97% had a sleep efficiency > 85% estimated as very good according to the PSQI,

- 54.92% had a sleep efficiency between 75-84% estimated as fairly good.

- 12.43% had a sleep efficiency between 65-74% estimated as fairly poor and

- 4.66% had a sleep efficiency of less than 65% considered very poor according to the PSQI.

**Component 5** : Sleep disorders

* The intensity of sleep disturbance among healthcare professionals was :

- 40.41% had mild sleep problems

- 53.88% had moderate sleep problems

- serious sleep problems in 5.69% of cases

* 87.56% of patients woke up in the middle of the night or early in the morning, 34.71% of them 3 or 4 times a week.
* These awakenings were caused by

- 91.70% had nocturnal needs. The number of awakenings was 3 or 4 times a week for 40.41%.

- cold in 64.24%, including 15.54% 3 or 4 times a week;

- heat in 25.38%, including 3.10% 3 or 4 times a week

- bad dreams in 62.69%, of which 10.88% 3 or 4 times a week; pain in 49.22%, of which 10.36% 3 or 4 times a week;

- coughing in 36.78% of cases, of which 6.21% 3 or 4 times a week;

- respiratory discomfort in 19.68%, of which 4.66% 3 or 4 times a week

- other reasons in 29.53%, including 7.25% 3 or 4 times a week.

**Component 6** : Use of sleep medication

Among healthcare professionals with sleep disorders :

- 81.34% had not taken any medication (prescribed by their doctor or bought without a prescription) to help them sleep in the last month,

- 8.29% took medication (prescribed by their doctor or purchased without a prescription) to help them sleep less than once a week.

- 6.21% took medication once or twice a week to help them sleep

- 4.14% took medication 3 or 4 times a week to help them sleep over the last month.

**Component 7** : Poor physical condition during the day

* Among healthcare professionals with sleep disorders,

- 24.35% were in fairly poor physical condition during the day

- 6.21% were in very poor physical condition during the day.

* In addition,

- 55.95% had no difficulty staying awake while driving, eating or socialising over the past month.

- 22.79% had slight difficulty staying awake while driving, eating or engaged in a social activity during the past month,

* Lastly,

- 13.98% had moderate difficulties and

- 7.25% had major difficulties staying awake while driving, eating or engaged in a social activity.

Factors associated with sleep disorders

On univariate analysis, two variables were found to be associated with sleep disorders : the use of sleep medication and work-related stress, with P<0.0012 and P<0.00 respectively.

**DISCUSSION**

During the study, 52.45% of healthcare professionals had sleep disorders according to the PSQI. This frequency is close to the 54.2% reported by Kolo et al **[1]** in Nigeria. The same trend is also found in developed countries, with 59.5% reported by Patterson et al **[8]** in the United States and 42.3% by Olawale et al **[9]** in Saudi Arabia. Sleep disorders therefore affect half of all healthcare workers. While stress, mental and physical strain are generally to blame, in Burkina Faso the difficult working conditions for relatively young healthcare workers, who are therefore faced with the multiple challenges of achieving an acceptable social life, could be one of the reasons. Nor should we forget the harmful effect of the sometimes harsh climatic variations in our region.

Other workers such as the military may have a high prevalence of sleep disorders as reported by Soyere et al in their study**[10]**

Health workers aged between 30 and 40 were the most affected by sleep disorders. This is also the age range most frequently encountered in this environment. Nena et al **[11]** also found that sleep disorders were more prevalent among healthcare professionals in their thirties and forties. According to Mathew et al **[12]**, young workers with less experience probably did not have the same coping skills as their older, more experienced colleagues, making them more prone to sleep disorders. This age is also the age of socio-professional achievement in our context, which can lead to stress and anxiety, thus affecting sleep quality.

Sleep disorders were almost gender-neutral in this study, which revealed only a slight female predominance (53.88%). This result is in line with the literature, Dong et al **[13]** explain this by the fact of female physiological and psychological characteristics. Also, in our African context, despite their professional occupations, women remain responsible for the care of the family, especially infants and young children, which leads them to wake up several times during the night, thus having a negative impact on the quality of their sleep.

Doctors, followed by nurses and midwives, were the professional groups most affected by sleep disorders. Olawale et al **[9]** also noted in their study that 25% of doctors were the most affected by sleep disorders. This study took place in a university hospital, where doctors were well represented, with a large cohort of doctors in training in various medical specialities. These doctors have a heavy workload in their various specialist departments, and are generally on call more often than other health professionals, exposing them to a greater risk of sleep disorders. In addition, several studies, including those by Sorensen et al **[14]** and Nikfar et al **[3]**, have shown that nursing staff are more affected by sleep disorders than non-healthcare staff.

Occupational stress affected more than half (63.21%) of healthcare professionals with sleep disorders. Alamri et al **[15**] found in their study that less than half (41.3%) of healthcare professionals with sleep disorders were affected by occupational stress. A statistically significant link was found between occupational stress and the occurrence of sleep disorders in healthcare professionals. In fact, having occupational stress increased the risk of having sleep disorders by 3.81 times compared to those without occupational stress. Olawale et al **[9]** showed in their study that work-related stress was a risk factor for sleep disorders because most healthcare professionals who experienced work-related stress had sleep disorders.

In our study, gynaecology, anaesthesia-intensive care and paediatrics were the departments where healthcare professionals were most affected by sleep disorders, with 19.2%, 12.1% and 8.8% respectively. Liu et all **[16]** in China revealed in their study that the probability of having sleep disorders was 1.5 times higher in healthcare professionals on clinical wards compared with those on non-clinical wards. However, the impact of the service on sleep quality must be interpreted with Caution must be exercised, as the influence of previous departmental rotations on current sleep quality cannot be completely ruled out.

In the population of healthcare professionals, those who were on call between 5 and 8 times a month were the most affected by sleep disorders, accounting for 74.09%. According to Nena et al **[11]** in Brazil, healthcare professionals who were on call several times a month were more affected by sleep disorders. Shift work is likely to have adverse effects on the daily life, efficiency and health of healthcare workers, mainly because of the quantitative and qualitative loss of sleep. The same observation has been made by other authors, including Sorensen et al **[14]** in the United States and McDowall et al **[17]** in England, who revealed in their study that overall, sleep disorders were significantly higher in shift workers than in non-shift workers, because shift work, and in particular night work, is known to disrupt the sleep-wake cycle and its synchronisation with the diurnal rhythm and other endogenous rhythms, thus affecting physiological sleep. However, we did not find a statistically significant link between shift rotation and the occurrence of sleep disorders. In their study in Italy, Belingheri et al did not find any relationship between shift and sleep disorders in nursing students, but they do state that sleep disorders are a critical problem in this population, as the symptoms can lead to errors, accidents or poor results. **[18]**

During the course of the study, almost all of the healthcare professionals who were taking sleep medication had sleep problems (91.66%). We found a statistically significant link between the use of sleep medication and the occurrence of sleep disorders in healthcare professionals. Taking sleep medication increased the risk of having sleep disorders by 11.25 times compared with those who did not (P=0.0012). In addition, the literature has shown that sleep medications are responsible for long-term sleep disorders because of their possible rebound effect.

In our survey, 67 of the 123 healthcare professionals who consumed coffee or tea in the evening (54.91%) had sleep problems. The role of stimulants such as coffee and tea in disrupting sleep architecture is no longer in doubt **[19]**, although the present study did not find a statistically significant link between evening coffee or tea consumption and the onset of sleep disorders.

**CONCLUSION**

Health professionals are not immune to sleep disorders. The nature and causes of these disorders are diverse. The results of our study revealed a prevalence of sleep disorders among health professionals at CHU-B of 52.45%. The factors associated with these sleep disorders were the use of sleep medication and professional stress. The quality of sleep among healthcare professionals has a definite impact on patient safety. It is therefore necessary to look for alternatives to improve the quality of sleep of healthcare professionals in order to ensure better performance in their work.

**Ethical Approval and consent :**

The research was conducted in accordance with the protocol and good clinical practice. We obtained authorization from the general management of CHU-B for this study. Participants were informed of the purpose of the study and of their right to accept or refuse to participate. Before answering any questions, they were invited to give their signed informed consent and voluntarily completed the questionnaire. The data collection form was anonymous. There were no conflicts of interest in our study.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

REFERENCES

1. **Kolo ES, Ahmed AO, Hamisu A, Ajiya A, Akhiwu BI**. Sleep health of healthcare workers in Kano, Nigeria. Nigerian Journal of Clinical Practice.2017;20(4):479‑83. DOI: 10.4103/1119-3077.204378
2. **Axmacher N, Haupt S, Fernández G, Elger CE, Fell J**. The role of sleep in declarative memory consolidation--direct evidence by intracranial EEG. Cereb Cortex. mars 2008;18(3):500‑7. doi: 10.1093/cercor/bhm084.
3. **Nikfar B, Moazzami B, Chaichian S, Ghalichi L, Ekhlasi-Hundrieser M, Chashmyazdan M, et al**. Sleep Quality and its Main Determinants Among Staff in a Persian Private Hospital. Arch Iran Med. 01 2018;21(11):524‑9. PMID: 30551693
4. **Robbins R, Quan SF**. Sleep Disorders. NEJM Evidence. 24 sept 2024;3(10):EVIDra2400096 DOI: 10.1056/EVIDra2400096
5. **Sen A, Tai XY.** Sleep Duration and Executive Function in Adults. Curr Neurol Neurosci Rep. nov 2023;23(11):801‑13. doi: 10.1007/s11910-023-01309-8.
6. **Elhefny RA, Mously SE, Sobhi S, Wahed WYA**. Evaluation of sleep related breathing problems and sleep disturbances among health related employees at Fayoum University Hospitals. Egyptian Journal of Chest Diseases and Tuberculosis.2016;65(3):667‑72. <https://doi.org/10.1016/j.ejcdt.2016.02.009>
7. **Slim E, Mattar M, Abi Rizk G**. La qualité du sommeil chez les internes : étude transversale chez les internes à l’hôpital Hôtel-Dieu de France (Liban). Pédagogie Médicale. févr 2014;15(1):31‑42. https://doi.org/10.1051/pmed/2014007
8. **Patterson PD, Weaver MD, Frank RC, Warner CW, Martin-Gill C, Guyette FX, et al**. Association between poor sleep, fatigue, and safety outcomes in Emergency Medical Services providers. Prehosp Emerg Care.2012;16(1):86‑97.Doi: 10.3109/10903127.2011.616261.
9. **Olawale OO, Taiwo OA, Hesham A**. Quality of sleep and well-being of health workers in Najran, Saudi Arabia. Indian J Psychiatry. 2017;59(3):347‑51. Doi: 10.4103/psychiatry
10. 1. **Soyere G, Sauvet F, Traccard C, Van Beers P, Fusaï T, Bonin O, et al**. Prévalence des troubles du sommeil et évaluation d’une formation d’éducation thérapeutique aux règles d’hygiène du sommeil chez des militaires français. Médecine du Sommeil [Internet]. 1 mars 2018 [cité 24 mai 2025];15(1):45‑6. https://doi.org/10.1016/j.msom.2018.01.121
11. **Nena E, Katsaouni M, Steiropoulos P, Theodorou E, Constantinidis TC, Tripsianis G**. Effect of shift work on sleep, health, and quality of life of health-care workers. Indian Journal of Occupational and Environmental Medicine.2018;22(1):29. doi: 10.4103/ijoem.IJOEM\_4\_18.
12. **Mathew JJ, Joseph M, Britto M, Joseph B**. Shift work disorder and its related factors among health-care workers in a Tertiary Care Hospital in Bangalore, India. Pak J Med Sci. 2018;34(5):1076‑81. doi: 10.12669/pjms.345.16026.
13. **Dong H, Zhang Q, Sun Z, Sang F, Xu Y**. Sleep problems among Chinese clinical nurses working in general hospitals. Occup Med (Lond). Oxford Academic; 2017;67(7):534‑9. DOI: 10.1093/occmed/kqx124
14. **Sorensen G, Stoddard AM, Stoffel S, Buxton O, Sembajwe G, Hashimoto D, et al**. The Role of the Work Context in Multiple Wellness Outcomes for Hospital Patient Care Workers. Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine;2011;53(8):899. DOI: 10.1097/JOM.0b013e318226a74a
15. **Alamri AF, A. Amer S, Almubarak A, Alanazi H.** Sleep Quality among Healthcare Providers; In Riyadh, 2019. Inter J of Med Sci and Clin Inv.2019;6(05):4438‑48 DOI:10.18535/ijmsci/v6i5.03
16. **Liu H, Liu J, Chen M, Tan X, Zheng T, Kang Z, et al**. Sleep problems of healthcare workers in tertiary hospital and influencing factors identified through a multilevel analysis: a cross-sectional study in China;2019;9(12). DOI: 10.1136/bmjopen-2019-032239
17. **McDowall K, Murphy E, Anderson K.** The impact of shift work on sleep quality among nurses. Occupational Medicine.2017;67(8):621‑5. DOI: 10.1093/occmed/kqx152
18. **Belingheri M, Luciani M, Ausili D, Paladino ME, Di Mauro S, De Vito G, et al**. Sleep disorders and night-shift work in nursing students: a cross-sectional study. Med Lav. 22 févr 2022;113(1):e2022003. DOI: https://doi.org/10.23749/mdl.v113i1.12150
19. **Shiffer D, Minonzio M, Dipaola F, Bertola M, Zamuner AR, Dalla Vecchia LA, et al.** Effects of Clockwise and Counterclockwise Job Shift Work Rotation on Sleep and Work-Life Balance on Hospital Nurses. Int J Environ Res Public Health. 2018;15(9). DOI: 10.3390/ijerph15092038