Shift work among nurses in public hospitals in the Congo: Consequences on sleep.

ABSTRACT

Introduction: The negative effects of shift work on sleep are well documented. The requirement for permanent hospital care requires nurses to adopt this organization. The objective of this study was to assess these effects on the sleep of nurses in Congolese public hospitals. **Materials and methods:** This was a multi-centre, cross-sectional descriptive study conducted from January to November 2021 with nurses from nine public hospitals. Data were collected using the Epworth Sleepiness Scale and the Pittsburgh Sleep Quality Index. **Results:** The study included 700 nurses with a 22.54% participation rate. Female staff (83.6%) and those aged 30 to 50 (76.1%) were predominant, with 64.9% being nurses and 35.1% being caregivers. The "2X12" work schedule was predominant (66.6%), 73.9% of staff had a continuous pace and 94.6% had rapid turnover. Daytime sleepiness, drowsiness and poor sleep quality were observed in 33.6%, 4.9% and 42% of nurses, respectively. Significant associations were found between sleep disorders on the one hand and age, number of dependent children, hours, and pace of shift work on the other. **Conclusion:** The health impacts of the work, including sleep disorders in nurses in our hospitals, are real and require prevention, which will result in better services for patients.

Keywords: Shift work, nurses, sleep disorders, public hospitals, Congo-Brazzaville

INTRODUCTION

Shift work is an arrangement of working hours involving two or more shifts of workers, in order to extend working hours beyond those of conventional offices [1].

The growing demand for 24/7 services in the modern world has contributed to the growing number of companies that force their employees to work shift work schedules, including rotating shifts, evening or night work. It is estimated that about 15-30% of the western labour force is employed in shift or night work [2].

This organization of working time is the prerogative of health care institutions to ensure, 24-hour and 7-day care. Shift work is a common practice for nurses despite the fact that such work models strongly interfere with sleep and quality of life [3].

The main difficulty of working irregular hours or at night lies in the fact that he asks the body to provide benefits when he is predisposed to sleep, and imposes sleep on him when he should normally be active. Several studies show that shift work desynchronizes the circadian rhythm and thus causes sleep disorders [4].

As an important biological function, sleep plays a role in various physiological processes of organisms. Irregular sleep patterns and poor sleep quality are therefore crucial concerns for rotating team nurses [5]. Nursing care is demanding for on-duty caregivers. Poor sleep quality related to shift work among hospital nurses is a critical issue for the health system [6].

In sub-Saharan Africa, there have been few studies on shift work among nurses.

In the Congo, a study of 91 nurses at the Loandjili General Hospital in Pointe-Noire found that shift work had a negative impact on their sleep and quality of life away from work [7]. However, its conclusions cannot be extrapolated to all health care workers in the Congo.

Thus, the lack of literature on the impact of shift work in Congolese health facilities justified the carrying out of this study, the aim of which was to assess the effects of shift work on the sleep of nurses in hospitals public.

MATERIALS AND METHODS OF STUDY

1. Type, Frames and Study Population

It was a multi-centre, descriptive and cross-sectional survey of prospective data collected from January to November 2021, or 11 months, in nine public hospitals in four administrative departments of the Congo. The hospitals selected were:

- In Brazzaville: University Hospital Center, Central Hospital of Army Pierre Mobengo, Reference Hospital of Makelekele and Reference Hospital of Talangaï.
- In Pointe-Noire: Adolphe Sicé General Hospital, Basic Hospital of Tié-Tié, and Regional Hospital of Army,
- A Dolisie : Dolisie General Hospital,
- A Oyo: Edith Lucie Bongo-Ondimba General Hospital

The study population, recruited on a comprehensive sampling basis, consisted of nurses working in the various departments of the selected hospitals, present at the time of the survey and who agreed to complete the questionnaire. These caregivers should have a minimum of 20 hours of work per week and 12 months of actual service.

The nurses recruited were divided into 3 groups:

- Group I(IM): Nurses and Orderlies with a "3x8" Work Rhythm
- Group II(GII): Nurses and Orderlies with a 2x12 Work Rhythm
- Group III(GIII): nurses and orderlies working only during the day from 7 to 14 hours.

2. Study methods

2.1. Procedure

In each department, the survey was managed by the nursing supervisor of the department. The questionnaires were distributed to all caregivers. Completed questionnaires were collected at the end of each week.

2.2. Data collection and judgement criteria

The various data from the study were collected using a survey sheet combining the Epworth Sleepiness Scale and the Pittsburgh Sleep Quality Index (PSQI). These are two recommended tools for the medical monitoring of shift and night work [8].

The Epworth Sleepiness Scale consists of eight items corresponding to situations that may cause sleepiness. Each item is rated as follows:

- No risk of falling asleep= 0
- Small chance of falling asleep = 1

- Average chance of dozing = 2
- Great chance of falling asleep = 3.

A total score, ranging from 0 to 24, is then obtained by summing the scores of the eight items. If the score > 10, we speak of sleepiness or sleep deficit and a score 16 corresponds to excessive sleepiness or daytime hypersleepiness.

The QISP consists of 19 self-assessment questions and five questions for the spouse or roommate (if any). Only the self-assessment questions are included in the score.

The 19 self-assessment questions combine to give seven "components" of the overall score, with each component receiving a score of 0 to 3.

- Subjective quality of sleep;
- Latency of sleep;
- Duration of sleep;
- Usual sleep efficiency;
- Sleep disorders;
- Use of sleep medication;
- Poor form during the day

In all cases, a score of 0 indicates that there is no difficulty while a score of 3 indicates the existence of severe difficulties. The 7 components of the score add up to give an overall score ranging from 0 to 21 points, 0 meaning there is no difficulty, and 21 indicating major difficulties. The latter is inversely proportional to the overall quality of sleep, and a score of strictly higher than 5 is equivalent to poor quality sleep and a score of less than or equal to 5 is equivalent to good quality sleep.

3. Study variables

The survey data collected from the questionnaire were first the independent variables including age, sex, marital status, number of dependent children, the work place and the components of the work rhythm and secondarily the main variables dependent in particular sleepiness and sleep quality disorders.

4. Statistical Analysis

The data from this study was entered on the Cs Pro 7.2 software and exported to the 2021 Excel spreadsheet for processing. The statistical analyses were done with the SPSS 25 software.

Qualitative variables were presented in tables of numbers and proportions. The quantitative variables were summarized as standard deviation averages.

For comparison of proportions, the Pearson Chi-2 test was used. The ANOVA test was used to compare quantitative variables when the independent variable had at least three modalities. The significance threshold was set at 5%.

RESULTS

1. General and socio-professional characteristics of the population.

During the study period, the selection criteria allowed for 700 nursing staff to be retained out of the 3,106 expected, representing a 22.5% participation rate.

The average age was 39.2 years 8.1 with extremes of 21 and 60 years. The average number of dependent children was 3.5 children 2 per person with extremes of 0 to 10. The Sex Ratio (F/H) was 5.1 or 5 women per 1 man.

Table I provides a summary of all epidemiological parameters for the study population.

2. Pace of work

According to the rhythm of work, nurses were distributed as shown in Table II. Overall, shift work was 73.9% continuous and 94.6% continuous.

3. Sleep disorders

According to the Epworth score in the study population, 33.6% of nurses had daytime sleepiness and 4.9% had hypersleepiness. As for the overall PSQI score, 42.3% had an overall PSQI score higher than 5, so poor sleep quality and 57.7% good sleep quality.

4. Sleepiness and socio-professional characteristics

The prevalence of this sleep disorder increased with age. Female nurses and those with more than 3 dependent children suffered more from daytime sleepiness and hypersomnolence than others (Table III).

5. Sleepiness and rhythm of work

The prevalence of daytime drowsiness and hyperdrowsiness was higher among nurses and caregivers with “3x8” and “2x12” rhythms and also among those with continuous alternating shifts (Table IV).

6. Quality of sleep and socio-professional characteristics.

According to socio-professional characteristics, the prevalence of poor sleep quality increased significantly with age (Table V).

7. Quality of sleep and working rhythm.

The prevalence of poor sleep quality was higher with a significant difference in nurses with a rate of ‘3x8’ and continuous.

DISCUSSION

This work was done in a specific Covid-19 pandemic health context. Some selected establishments were operating on minimum duty for strike reasons. These changes could constitute a selection bias minimized by the completeness of the selection of the study population. Nevertheless, the prospective nature of this study ensures an optimal quality of the results found thus avoiding any reporting bias. Moreover, the use of two scientifically validated and universally recognized questionnaires is a strength.

In the study population, 38.5% of nurses suffered from drowsiness, 33.6% from daytime sleepiness and 4.9% from hyperdrowsiness. These results are superimposed on those reported by Bouden *et al* in Tunisia, on an interesting population of 100 employees working shift work in an agribusiness with 40% drowsiness including 6% with excessive daytime sleepiness [9]. In contrast, Ebatetou *et al* reported a prevalence of sleepiness of 67% in a population of 91 nurses at a general hospital in Pointe-Noire [7]. The differences observed in this work could be explained by the larger sample size.

Female nurses suffered more from drowsiness due to environmental factors and time difference, meaning that, apart from sleep debt, women are replaced by family obligations for their rest hours, the burden of children outside working hours. As reported in the literature review, women who work alternately suffer more from daytime sleepiness, especially as they are older and have at least one dependent child [10,11].

With regard to the link between sleepiness and pace of work. , shift workers suffered from excessive daytime sleepiness compared to those working only during the day with a higher significance in group I (3x8). In the shift system, night shifts and rapid returns are associated with short sleep, and increased sleepiness. This pace of work is constraining because it is marked by a rapid return to work, insufficient rest days and an extension of working hours accentuated by transport. Indeed, circadian desynchronization, the reduction of sleep time are incriminated. For example, night and shift workers are exposed to work at the time when the sleep pressure is highest (between 2 and 5 in the morning). In addition, the chronic sleep debt associated with the daily reduction of about one hour of sleep time promotes drowsiness in monotonous situations, but also sometimes at meetings, driving or at the workstation [11-13].

This study found that 42.3% of nurses had poor sleep quality. Age, working hours and the continuous nature of shift work were factors affecting the quality of sleep. Previous studies by other authors have also reported high prevalence of poor sleep quality: 43.1% for Ghalichi *et al* in Tehran among health workers [14], 48.6% among nurses in Saudi Arabia [15]57% among nurses in Taiwan [16], 58.3% among nurses in Nigeria [17], and 65.8% in China among nurses practising in emergency departments [18].

The poor quality of sleep increased with the age of the nursing staff. This observation was also made by Palhares *et al* in Brazil [19].

It was found in this work that nurses on shift "3x8" and "2x12" had significantly higher poor sleep quality compared to those working only during the day. The same was true when the rhythm was continuous rather than semi-continuous or discontinuous. This finding is corroborated by the literature where poor sleep quality is more prevalent among shift workers than shift workers [11,18]. In contrast, Huth *et al*, using another methodology, did not find an association between sleep quality and shift work [20].

These results show that shift work affects sleep qualitatively and quantitatively. Shift and night work causes a desynchronization between the circadian rhythms established on a day schedule and the new activity-rest/wake-sleep cycle induced by shift and night work. This desynchronization is also favored by the disadapted environmental conditions at sleep: daylight during rest, higher temperature than usual at night, higher noise level during the day, social rhythm and family

obligations. All these physical and sociological environmental factors contribute to disrupting the quality and quantity of sleep [12].

CONCLUSION

Shift work is an essential mode of organisation in health care establishments because it ensures the permanence and continuity of care. This work has shown that its impact on sleep among nurses in public hospitals across the country is real. Thus, in order to prevent health problems related to shift work, careful monitoring of occupational physicians integrated into a network of care including treating physicians, occupational psychologists, specialized sleep centres should be established to control the morbidity inherent in the extrinsic disturbances of the circadian rhythm.

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List of tables

Table I: Distribution of nurses by socio-demographic and occupational characteristics

Variables	Headcount (N=700)	Percentage (%)
Sex		
Male	115	16.4
Female	585	83.6
Age (years)		
[20 ; 29]	98	14.0
[30 ; 39]	266	38.0
[40 ; 49]	267	38.1
≥50	69	9.9
Marital status		
Married	308	44.0
Single	370	52.9
Widow	22	3.1
Number of dependent children		
0	43	6.1
1 – 3	309	44.1
>3	348	49.7
Workstation		
Nurses	454	64.9
Orderlies	246	35.1
Place of exercise		
Brazzaville	381	54.4
Pointe-Noire	185	26.4
Dolisie	99	14.2
Oyo	35	5.0

Table1: Distribution of Nurses by Pace of Work

Variables	Headcount (N=700)	Percentage (%)
Hours of work		

GI (3x8=	88	12.6
GII (2x12)	466	66.6
GIII (7h – 14 h)	146	20.9
Continuity		
Continuous	517	73.9
Semi-continuous	78	11.1
Discontinuous	105	15.0
Type of rotation		
Long	38	5.4
Short	662	94.6

GI: Group I, GII: Group II, GIII: Group III

TableII: Representation of daytime sleepiness by socio-professional characteristics of nurses.

Variables	Lack of sleepiness Score ESS 0-10	Daytime sleepiness Score ESS 11-15	hypersleepiness Score ESS ≥16	p-value

Sex				0.014
Male	84 (73.0)	29 (25.2)	2 (1.7)	
Female	347 (59.3)	206 (35.2)	32 (5.5)	
Age (years)				0.000
[20 ; 29]	84 (85.7)	14 (14.3)	0 (0.0)	
[30 ; 39]	171 (64.3)	81 (30.5)	14 (5.3)	
[40 ; 49]	144 (53.9)	107 (40.1)	16 (6.0)	
≥50	32(46.4)	33(47.8)	4(5.8)	
Marital status				0.641
Married	182 (59.1)	108 (35.1)	18 (5.8)	
Single	236 (63.8)	119 (32.2)	15 (4.1)	
Widow	13 (59.1)	8 (36.4)	1 (4.5)	
Workstation				0.081
Nurses	282 (62.1)	156 (34.4)	16 (3.5)	
Orderlies	149 (60.6)	79 (32.1)	18 (7.3)	
Number of dependent children				0.001
0	34 (79.1)	9 (20.9)	0 (0.0)	
[1 ; 3]	206 (66.7)	94 (30.4)	9 (2.9)	
>3	191 (54.9)	132 (37.9)	25 (7.2)	

ESS : *Epworth Sleepiness Scale*

Table IV: Representation of sleepiness in relation to work pace

Variables	**Lack of sleepiness**	**Daytime sleepiness**	**hypersleepiness**	**p-value**

	Score ESS 0-10	Score ESS 11-15	Score ESS≥16	
Work schedule				0.000
GI (3x8)	35 (39.8)	40 (17.0)	13 (14.8)	
GII (2x12)	275 (59.0)	171 (36.7)	20 (4.3)	
GIII (7h – 14 h)	121 (82.9)	24 (16.4)	1 (0.7)	
Continuity				0.000
Continuous	289 (55.9)	194 (37.5)	34 (6.6)	
Semi-continuous	54 (69.2)	24 (30.8)	0 (0.0)	
Discontinuous	88 (83.8)	17 (16.2)	0 (0.0)	
Type of rotation				0.281
Long	28 (73.7)	9 (23.7)	1 (2.6)	
Short	403 (60.9)	226 (34.1)	33 (5.0)	

ESS : *Epworth Sleepiness Scale*

Table V: Representation of overall sleep quality by socio-professional characteristics

Variables	Quality of sleep		p-value
	Good (PSQI Score 5)	Bad (PSQI score >5)	
Sex			0.607
Male	69 (60.0)	46 (40.0)	
Female	335 (57.3)	250 (42.7)	
Age (years)			0.001
[20 ; 29]	71 (72.4)	27 (27.6)	
[30 ; 39]	162 (60.9)	104 (39.1)	
[40 ; 49]	137 (51.3)	130 (48.7)	
≥50	34 (49.3)	35 (50.7)	
Marital status			0.099
Married	164 (53.2)	144 (46.8)	
Single	226 (61.1)	144 (38.9)	
Widow	14 (63.6)	8 (36.4)	
Number of dependent children			0.306
0	25 (58.1)	18 (41.9)	
1 – 3	188 (60.8)	121 (39.2)	
>3	191 (54.9)	157 (45.1)	
Workstation			0.523
Nurses	258 (56.8)	196 (43.2)	
Orderlies	146 (59.3)	100 (40.7)	

PSQI : *Pittsburgh Sleep Quality Index*

Table VI: Representation of overall sleep quality by work rhythm

Variables	Quality of sleep		p-value
	Good (PSQI Score 5)	Bad (PSQI score >5)	
Work schedule			0.000
GI (3x8)	30 (34.1)	58 (65.9)	
GII (2x12)	264 (56.7)	202 (43.3)	
GIII (7h – 14 h)	110 (75,3)	36 (24,7)	
Continuity			0.000
Continuous	264 (51.1)	253 (48.9)	
Semi-continuous	58 (74.4)	20 (25.6)	
Discontinuous	82 (78.1)	23 (21.9)	
Type of rotation			0.086
Long	27 (71.1)	11 (28.9)	
Short	377 (56.9)	285 (43.1)	

PSQI : *Pittsburgh Sleep Quality Index*