▪ Headache Medicine 2020, 11(2):44-47 ▪ ISSN 2178-7468, e-ISSN 2763-6178

Headache Medicine

▪ DOI: 10.48208/HeadacheMed.2020.13

Original

Headache triggered by sleep deprivation: an observational study

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Edited by
Mario Fernando Prieto Peres

Abstract

Introduction
Sleep deprivation is one of the main triggers of primary headaches, especially in migraine patients.
Objective
To determine the prevalence of headache triggered by sleep deprivation in night workers.
Methods
The study was cross-sectional, observational, non-random and convenience. We interviewed 71 night workers of a public hospital with diagnosis of primary headaches and presence of headache the day after night shift.
Results
The 71 night workers (50 women and 21 men) had a mean age of 36.7±7.7 years, ranging from 22 to 50 years. Of these workers, 83.2% were diagnosed with migraine and 16.9% with tension-type headache (TTH). The number of monthly night shifts was greater than 10, in 50.8% of migraine patients and in 58.3% of those with TTH. It was observed that 91.5% of migraine patients and 83.3% of patients with TTH slept ≥ 6 hours a night when they were at home, but when they were at work, they all slept ≤ 4 hours a night. Headache occurred the following day of night work in 83.1% of migraine patients and in 41.7% of those with TTH (p=0.005).
Conclusion
Headache triggered by sleep deprivation was highly prevalent, predominating in migraine patients.

Keywords:
Headache
Sleep
Migraine Disorders
Prevalence

Received: April 13, 2020.
Accepted: April 27, 2020.

Introduction

In primary headaches, headache attacks may be triggered by several factors, such as stress, eating habits, sensory stimuli, menstrual changes and sleep deprivation, especially in patients with migraine.[1,2] The prevalence of headache attacks triggered by sleep deprivation in migraine patients ranges from 28.5% to 56.7%[3,4,5] and in patients with tension-type headache (TTH) it is 28.8%[3].

There is a relationship between sleep and primary headaches as a trigger for headache attacks, both deprivation and excess sleep[6], but this mechanism is not fully understood, despite being a frequent complaint of migraine and TTH patients[7]. On the other hand, restorative sleep with sufficient sleep hours works as a relief factor for headache attacks.[8]

Almost half of the population has some sleep disorder, mainly insomnia[9]. Sleep disorders represent an important public health problem in the world and are comorbidities of primary headaches. In contrast, primary headaches have great social impact and risk of chronification.[10,11]

Despite the social impact, headache attacks triggered by sleep deprivation in patients with migraine or TTH have not been sufficiently studied. This is the first Brazilian population study on headache triggered by sleep deprivation.

Patients and methods

Study design and patients

A prospective, cross-sectional, group comparative study was conducted on a non-random and convenience sampling which was selected from night workers of a public hospital and invited to participate in this research. The sample consisted of 71 night workers diagnosed with primary headaches according to the ICHD-3 criteria.[12]

Inclusion and exclusion criteria

The study included night workers of a public hospital, aged 18 to 50 years diagnosed with primary headaches according to the ICHD-3 criteria[12] who agreed to undergo an interview. Those who reported daily or almost daily headache, no headache in the last 12 months, association of two or more primary headaches, concomitantly or at different times, secondary headaches, and pregnant women were excluded.

Data collection

After fulfilling the inclusion and exclusion criteria, a structured interview was conducted, based on a questionnaire to diagnose the presence of headache on the day after night shift. The number of times the worker slept at work and the number of hours he/she slept at home and at work were investigated.

Statistical analysis

Organized the information in a database, the Statistical Package for Social Sciences (SPSS™) version 22.0 was used for statistical analysis. The chi-square test with Yates correction, Student's t-test and Fisher's exact test were used for the difference of means of unpaired samples, with a significance level of 0.05.

Ethical aspects

This study was approved by the Ethics in Research Involving Human Subjects Committee at the Federal University of Piauí, protocol number 3,305,167 and the National Ethics in Research System, registry number 08850918.0.0000.5214, on May 6, 2019. Data were collected from May to June 2019 and all volunteers signed the Informed Consent Form.

Results

Seventy-one night workers, aged 36.7±7.7 years, ranging from 22 to 50 years, were investigated, of which 50 (70.4%) were women, corresponding to the sex ratio of 1:4.9 male/female. After headache diagnosis, it was found that 59 (83.1%) workers had migraine and 12 (16.9%) met the diagnostic criteria for TTH. Migraine affected workers aged 36.0±7.6 years, while in TTH, the age was 35.8±8.8 years (p=0.935) (Table 1).

Table 1. Distribution of sex and age according to diagnosis of 59 migraine patients and 12 with tension-type headache

Variables	Diagnosis	Migraine	TTH
Gender			
Female (n; %)	45 (76.3)	5 (41.7)	0.032*
Male (n; %)	14 (23.7)	7 (58.3)	
Age (years)			
Mean (SD)	36.0 (7.6)	35.8 (8.8)	0.935**
Variation	23-50	22-50	

Note: TTH - tension-type headache; SD - standard deviation; * - p-value based on Fisher's exact test for mean difference of unpaired samples. ** - p value based on Student's t-test for mean differences in unpaired samples

The number of monthly night shifts was greater than 10 in 50.8% of migraine patients and 58.3% of patients with TTH (p=0.876). We found that 91.5% of migraine patients and 83.3% of patients with TTH slept six or more hours a night when they were at home, but when on duty, 100% slept four hours or less a night (Table 2).

Table 2. Distribution of the number of monthly night shifts, hours the worker slept at home and night work, and the presence of headache the day after night shift in 59 migraine patients and 12 with tension-type headache

Variables	Diagnosis		p-value
	Migraine	TTH	
Monthly night shifts			0.876*
< 10	29 (49.5)	5 (41.7)	
≥ 10	30 (50.8)	7 (58.3)	
Number of hours he/she slept at home			0.592**
< 6	5 (8.5)	2 (16.7)	
≥ 6	54 (91.5)	10 (83.3)	
Number of hours he/she slept at work			0.717**
< 3	15 (25.4)	2 (16.6)	
3 or 4	44 (74.6)	10 (83.3)	
Presence of headache the day after night shift			0.005**
Yes	49 (83.1)	5 (41.7)	
No	10 (16.9)	7 (58.3)	

It was found that 83.1% (49/59) of migraine patients and 41.7% (5/12) of those with TTH presented headache the next day after night shift. These differences were significant (p = 0.005) (Tables 2 and 3).

Table 3. Distribution of the frequency of headache triggered by sleep deprivation in 59 migraine patients and 12 with tension-type headache

Variables	Diagnosis		p-value
	Migraine	TTH	
Never	10 (16.9)	7 (58.3)	0.005*
Rarely	27 (45.8)	3 (25.0)	
Most of the time	20 (33.9)	2 (16.7)	
Every times	2 (3.4)	0 (0.0)	

Note: TTH - tension-type headache; p value calculated by Fisher's exact test, comparing: * no versus ≥ rarely, most of the time or every time.

Discussion

In this study, two groups of night workers diagnosed with migraine or TTH were compared by the relationship between headache and sleep deprivation. Therefore, in order to obtain valid and consistent data, a correct diagnosis was established for each headache, according to the criteria of ICHD-3.[12]

Primary headaches, especially migraine and TTH, are the main diagnoses found in hospitals and clinics worldwide.[13-15] These headaches have significant morbidity and socioeconomic effect[16], demonstrating a great importance for public health as it affects patients at the most productive age of their lives, between 30 and 40 years of age[17], as noted in this study.

Sleep deprivation has always been known as one of the factors that trigger a headache attack in migraine patients[1], but a community study in Malaysia has shown that sleep deprivation triggers headache attacks in both migraine and TTH patients.[18]

Many patients have both migraine and TTH. In this case, the differentiation between these two primary headaches, especially in mild forms, represents a diagnostic challenge. Some factors serve to differentiate migraine from TTH, such as headache triggered by odors that occurs only in migraine patients.[19] In our study, headache triggered by sleep deprivation was more prevalent in migraine patients, with statistical significance, and could be a differentiating factor between these headaches.

Sleep deprivation triggers headache attacks in the general population, but mainly in people who work at night. Some of these workers sleep a few hours or sometimes do not have time to sleep. In addition, those who sleep a few hours do so in a different bed than the one they usually sleep on.

There was a higher percentage of migraine patients who had headache triggered by sleep deprivation. According to ICHD-3, in migraine, headache attacks are more severe than in TTH12 and this has a negative impact with a significant socioeconomic effect due to the greater probability of missing work and having more days lost.[10,11,16]

The brain mechanisms underlying altered pain processing after sleep deprivation are unknown. However, it is believed that inadequate sleep or even total sleep deprivation may reduce pain thresholds and amplify pain reactivity in the primary somatosensory cortex.[20,21]

Conclusion

Headache triggered by sleep deprivation is highly prevalent, predominating in migraine patients.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-forprofit sectors.
Conflict of Interest: There is no conflict of interest.

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