Sleep Medicine 16 (2015) 604–611

Contents lists available at ScienceDirect

Sleep Medicine

journal homepage: www.elsevier.com/locate/sleep

Original Article

Impact of hypnotics use on daytime function and factors associated with usage by female shift work nurses

Kunihiro Futenma [a], Shoichi Asaoka [b,c], Yoshikazu Takaesu [a], Yoko Komada [b,d], Jun Ishikawa [a], Akiko Murakoshi [a], Shingo Nishida [b,d], Yuichi Inoue [a,b,d,*]

[a] Department of Psychiatry, Tokyo Medical University Hospital, 6-7-1 Nishishinjuku, Shinjuku-ku, Tokyo 160-0023, Japan
[b] Department of Somnology, Tokyo Medical University, 6-1-1 Shinjuku, Shinjuku-ku, Tokyo 160-8402, Japan
[c] Sleep Research Institute, Edogawa University, 474 Komagi, Nagareyama, Chiba, 270-0132, Japan
[d] Japan Somnology Center, Neuropsychiatric Research Institute, 91 Bentencho, Shinjuku-ku, Tokyo, 162-0851, Japan

ARTICLE INFO

Article history:
Received 28 July 2014
Received in revised form 29 October 2014
Accepted 14 November 2014
Available online 10 February 2015

Keywords:
Shift work
Nurse
Sleep
Hypnotic medication use
Prevalence
Japan

ABSTRACT

Objective: We investigated quality of life (QOL) and work performance of hypnotics users, and explored the factors associated with multiple hypnotics usage in shift work nurses.
Methods: We conducted a questionnaire-based, cross-sectional survey on nurses in university hospitals. We analyzed responses from 1202 nurses; 997 were female shift work nurses (82.9%), including 696 and 281 two- and three-shift workers, respectively.
Results: The rate of hypnotics use was 10% (6.9% were single hypnotic users and 3.1% were multiple hypnotics users). The rate of insomnia did not differ between the single and multiple hypnotics users. However, multiple hypnotics users showed lower QOL, more severe depressive symptoms, and greater frequencies of work-related errors than those using a single hypnotic. A multiple logistic regression analysis revealed that age ≥27 years, presence of depression, eveningness chronotype, and presence of insomnia symptoms were significantly associated with hypnotics use. On the other hand, only the existence of shift work disorder (SWD) was significantly associated with usage of multiple hypnotics.
Conclusions: The present study suggested that usage of multiple hypnotics is not beneficial for relieving insomnia or for keeping better QOL in shift work nurses. It would be desirable to explore the causal relationship between SWD and multiple hypnotics use in a future longitudinal study.

1. Introduction

A rotating shift work system is a work pattern in which working hours are not fixed and the shift worker works on a variable time schedule including night shifts. In modern society, a certain number of people are engaged in shift work; according to a report based on a survey conducted by the Ministry of Health, Labour, and Welfare, 18.8% of workers in Japan were engaged in shift work in 2005 [1]. Under this situation, there are concerns for physical and mental health problems associated with sleep disorders, as well as negative impacts on working functions and performance at work in shift workers [2–4].

Shift work disorder (SWD) is a circadian rhythm sleep disorder caused by shift work that causes subjective/objective nocturnal insomnia or daytime sleepiness. Drake et al. estimated that 8.1% of the night and rotating shift workers had SWD symptoms [3]; they reported that the prevalence of SWD among nurses was relatively higher than that in the general population, reaching 32.4% to 37.6% [5]. Based on this background, as a part of the Nurses' Sleep Health Project, we conducted a series of studies on the actual status of SWD in Japanese nurses engaged in shift work. In the first study, we reported that the prevalence of SWD among Japanese nurses engaged in shift work reached 24.4% and that individuals with SWD more frequently had symptoms of depression, a deteriorated quality of life (QOL), and an increased tendency to make mistakes at work compared with those without SWD [6].

According to the American Academy of Sleep Medicine's Practice Guidelines on Circadian Rhythm Sleep Disorders, although usage of hypnotics to treat SWD has a beneficial effect in improving insomnia symptoms, there is a possibility that their muscle relaxation effect and the next-day "hangover" due to hypnotics may have a negative effect on work efficiency and safety [7,8]. No conclusion has yet been reached regarding the pros and cons of the use of hypnotics for treating SWD. Therefore, caution is necessary when using hypnotics to treat SWD. However, it should particularly be noted that the percentage of individuals using hypnotics was higher in nurses engaged in night work or rotating shift work than in the general population [9,10].

* Corresponding author. Tel.: +81 0 3 3351 6141; fax: +81 0 3 3351 6208.
E-mail address: inoue@somnology.com (Y. Inoue).

http://dx.doi.org/10.1016/j.sleep.2014.11.018
1389-9457/

When hypnotics are used at high doses, caution must be taken regarding the increased risk of developing the above-mentioned adverse effects [7,8] as well as the risk of developing dependence [11,12]. Although there have been studies on the percentage of hypnotics users among all nurses and the factors associated with the usage [9], there has been apparently no study on the percentage of users of high doses of hypnotics or on the percentage of users of combinations of multiple hypnotics. There has also been apparently no study on the associated factors or on the impact of the use of high doses or multiple kinds of hypnotics on daytime function. Considering these issues, as a second study of the Nurses' Sleep Health Project, we examined the current status of hypnotics usage among Japanese nurses engaged in rotating shift work. We also examined the indices of daytime function in the single hypnotic user and multiple hypnotics user and investigated the factors associated with the use of both single and combinations of multiple hypnotics.

2. Methods

2.1. Surveyed subjects and procedures

From September to October 2010, a questionnaire designed for this survey was distributed to a total of 1493 eligible nurses working in two university hospitals in Tokyo. The time limit for the collection of responses was set at two weeks after distribution. Answers were obtained from 1202 respondents (42 men, 1156 women, and four participants of unknown gender; mean age: 30.6 years, standard deviation: 8.3 years) (response rate: 80.5%). Among the respondents, 1042 were engaged in rotating shift work, of whom 727 (including 27 men) were two-shift workers and 315 (including 14 men) were three-shift workers. Respondents who worked only during the daytime (day workers) accounted for 114 nurses (0 men). In addition, two other respondents were night shift workers, and 44 others had indefinable working-hour patterns or did not fall into any of the categories listed above. The analysis was conducted on rotating shift workers, and because there were far fewer men than women, data from only 997 female respondents (age: 30.0 ± 8.0 years) were used in this study.

The most common start and end times were 8:00 and 18:00 for the day shift and 16:00 and 9:00 for the night shift among the two-shift workers. In the two-shift workers, the mean (standard deviation) frequency of day shift work was 11.3 (±3.5) times per month and that of night shift work was 4.5 (±1.7) times per month. In the three-shift workers, the most common day shift was 8:00–17:00, the evening shift was 16:00–24:00, and the night shift was 24:00–9:00. The mean (standard deviation) frequency of each shift was 13.7 (±5.2) times for the day shift, 3.0 (±1.5) times for the evening shift, and 3.1 (±1.5) times for the night shift per month, among the three-shift workers. However, in the hospitals where participants were working, the start and end times of each work shift differed slightly among the participants or departments. More than half of the three-shift workers (59%) reported that their shift rotation was irregular, 30% reported having a clockwise rotation schedule, and 9% had a counterclockwise rotation schedule. Most of the shift work nurses (88%) reported that they were not engaged in consecutive night shifts [6].

This study was initiated after obtaining approval from the ethics committee of Tokyo Medical University; written informed consent was also obtained from all the respondents.

2.2. Survey items

The questionnaire included demographic variables (such as age, gender, height, and weight) in addition to the following items.

2.2.1. Family structure and living conditions

Each participant was asked about his or her current family structure, namely whether he or she lived with roommates, a spouse, and/or children.

2.2.2. Items related to work environment

Questions were asked about the following: how long it had been since the participant started working as a nurse, the presence or absence of rotating shift work, and their job title. Shift workers were asked whether the pattern was two- or three-shift work and how long they had been working under the current shift system. In addition, the following questions were included: the start and end time of each shift, the presence or absence of consecutive night shifts, whether the system allows for taking naps during night shifts, and, if naps were allowed, whether participants had been able to take naps during night shifts. In addition, the participants were asked to self-report whether they had caused or almost caused (near-miss events) traffic accidents, medication errors, mistakes while performing procedures during work, or on-the-job injuries (such as needle sticks) during the past year.

2.2.3. Questions pertaining to sleep and hypnotics

The participants were asked to evaluate the following items according to a five-level assessment scale ranging from 1 for "not at all" to 5 for "always": difficulty falling asleep, arousal during sleep, early morning awakening, and daytime dysfunction due to lack of sleep. Respondents who answered 4 (often) or 5 (always) to one or more of the following nocturnal insomnia symptoms – difficulty falling asleep, arousal during sleep, and early-morning awakening – and who answered 4 (often) or 5 (always) to items pertaining to daytime dysfunction were considered as "presenting with insomnia symptoms" according to the diagnostic criteria for insomnia in the second edition of the International Classification of Sleep Disorders (ICSD-2) [13]. In addition, in order to assess whether the tendency of the circadian rhythm of participants was morningness or eveningness, the participants were asked to answer questions from the diurnal type scale [14], which was composed of seven questions. In this scale, higher scores would show that the respondent had a morningness type. In addition, the presence or absence of SWD was assessed using the same methods as those used in previous studies [6,15]; a person came under the SWD category if he or she answered "Yes" to the following three diagnostic criteria: (1) "presence or absence of insomnia or excessive sleepiness," (2) "whether the insomnia or excessive sleepiness is associated with the fact of being engaged in shift work," and (3) "whether the insomnia or excessive sleepiness had persisted for 1 month or longer [13]." In addition, the participants were asked about the names of hypnotics that they had taken during the previous month as well as the doses, frequency of intake, and the usual timing of intake. In this study, the group that used only one type of hypnotic was defined as "the single hypnotic group," and the group that used two or more different types of hypnotics was defined as "the multiple hypnotics group." The group that did not use hypnotics was defined as "the nonhypnotics group."

2.2.4. Questions about health status

Health-related QOL was measured using an eight-item version of the short form health survey (SF-8TM) [16]. The questionnaire consisted of eight endpoint items related to the concept of health, namely physical function, role functioning (physical), physical pain, overall sense of health, vitality, social functioning, role functioning (mental), and mental health. Each score was weighted and calculated using previously authorized methods. The calculated