Review Article

An Occupational Health Physician’s Report on the Improvement in the Sleeping Conditions of Night Shift Workers

Toshio HIROSE1*

1 Sendai Nishikicho Clinic and Occupational Health Center, 1–8–32, Nishikicho, Aoba-ku, Sendai 980-0012, Japan

Received September 21, 2004 and accepted November 30, 2004

Abstract: This paper reviews briefly our research findings on sleep and health for shift workers at a bakery and a dish factory and aims to give some information on health protection with improved sleep. Our medical examinations revealed that rises in blood pressure (BP) were frequently observed in male bakery workers on the fixed night shift. They took a two-hour nap from 1:00 to 3:00 during the night shifts according to our advice. As a result, their diastolic BP significantly decreased in subsequent years. Women working shifts before 3:00 at a dish factory seemed to show more sleep disturbance, higher daytime sleepiness, and more fatigue than those working shifts from 3:00. Total sleep hours taken during the daytime was similar between two groups. Among the dish factory workers who switched to midnight or night shifts, 70% reported slow recovery from fatigue and 30% felt deteriorated health. These women also reported increased efforts to obtain a deep sleep, probably making up for shortened sleep. Occupational physicians can act to improve shift work conditions through monitoring the health of workers, applying naps, and designing possible schedules to secure deep, sufficient sleep.

Key words: Shift work, Night work, Occupational physician, Sleep, Napping, Blood pressure

Introduction

A number of studies have identified sleep disturbances, ischemic heart diseases, peptic ulcers, reproductive hazards and hypertension to be the main health problems of shift workers1–4). Occupational physicians do recognize those problems, but they sometimes may not be certain how they should behave as key persons in the workplace. For more than ten years, we have been investigating night work and sleeping conditions in male workers at a bakery and female workers at a dish factory5–12). This paper summarizing our previous findings provides some information to improve the health of those shift workers mainly through sleep management.

*To whom correspondence should be addressed.
ROLE OF OCCUPATIONAL PHYSICIANS IN SLEEP MANAGEMENT

Paying attention to sleep and daily life of female workers at a dish factory

At dish factories, women are the dominant workforce and in turn required to work night/morning shifts to prepare the dishes by the morning. Obviously, those women face a number of health and social/family problems.

We present first some of the findings of health examination for a sample of 29 women who worked five days a week at a dish factory. Participants were divided into two groups; 13 women worked shift starting from 3:00 (Group A), and the remaining 16 worked shifts before 3:00 (Group B). No significant differences between groups were found for age (mean ± SD; 46.1 ± 8.1 vs. 49.2 ± 7.4 yr) or years of experience on night shifts (8.4 ± 3.2 vs. 7.2 ± 4.0 yr).

We examined if the workers had sleep disturbance in the past one month by the Pittsburgh Sleep Quality Index\(^{13}\), since deep, sufficient sleep is essential to continue night work. The results indicated that although the differences were not statistically significant, 68.8% of Group B was identified as poor sleeper as compared to 61.5% of Group A and that 50% of Group B had some difficulty in the daily life as compared to 38.5% of Group A. For the level of daytime sleepiness as assessed by the Epworth Sleepiness scale\(^{14}\), Group B tended to show higher daytime sleepiness while “sitting and reading” (item #1) than Group A (1.07 ± 0.96 [N=14] vs. 0.55 ± 0.66 [N=11], P=0.14). No significant difference between groups was observed in total sleep hours taken during the daytime.

Fatigue was also quantified using the Questionnaire for Work Related Fatigue Feelings (This questionnaire was revised in 2002 by the Research Group for Industrial Fatigue,

---

Fig. 1. Individual values of blood pressure measured at health checkup among male bakery workers (N=13)\(^{10}\).

Age groups: ○ 20 yr, ▲ 30 yr, □ 40 yr, ■ 50 yr.

frequency that seems to show elevated fatigue according to our previous study (data not shown). The mean diastolic BP decreased remarkably after introducing the nighttime nap (Fig. 2b). ABPM data for a napped worker is depicted in Fig. 3.

Fig. 2. Systolic (▲) and diastolic (●) blood pressure before and after two types of interventions for fixed night shifts among male bakery workers (N=10)\(^{10}\).

a: Rotating shifts begun in 1986 as indicated by a thin arrow (N=5, mean age 38.8 ± 9.1 yr). * P<0.05 compared with 1985. b: A 2-h nap was introduced during the fixed night shifts in 1987 as indicated by a thick arrow (N=5, mean age 42.2 ± 7.4). * P<0.05 compared with 1986. Error bars show SD.
Japan Society for Occupational Health\(^{(15)}\). Group B reported more symptoms than Group A for “tired in the legs” and “stiff in the shoulders”.

When focused upon Group A, however, it was found among half of this group that the mean BP for a whole day was higher than the normal limits proposed by Imai et al.\(^{(16)}\). Elevated BP was frequently observed during night shifts. A typical case before and after starting working night shifts is shown in Fig. 4. In addition, their BP often rose in the evening as well as late at night. Figure 5a depicts its representative pattern. The evening increase probably resulted from housework. Taking a 2-h nap in the evening, combined with antihypertensive medication, decreased her BP (Fig. 5b).

We also investigated the effects of changing shifts on a number of aspects of daily life among women working in a dish factory. An interview was held at their medical examination. The questions covered items and sub-items related to domestic and social life such as sleep, rest, meals, sports, family time, hobbies, neighborhood association, and social activities. These items were chosen on the basis of the report by the Night and Shift Work Committee of the Japan Association of Industrial Health in 1978\(^{(17)}\). Besides, three questions were added to evaluate health conditions, fatigue, and worry about the future\(^{(12)}\).

The main results showed that the workers attempted to obtain a deep sleep (for example, sleeping in a quiet, darkened...
bedroom) after changing the new shifts, probably to compensate for shortened sleep hours (Fig. 6). This effort was pretty common in those who transferred to midnight shifts from night shifts and in those who transferred to night shifts from day shifts. These shift changes seemed demanding, judged from almost 70% experiencing slow recovery from fatigue and approximately 30% reporting deteriorated health.

**Discussion**

The present result showed that BP decreased among the fixed night workers who took a 2-h nap according to our advice. This suggests napping as a promising measure against unfavorable consequences of working nights. Many investigators have emphasized that the nap during the night work is useful to protect worker’s health. Sasaki et al. reported that at least a rest of 120 min needed to take a 90-min nap. Presumably, habitual napping during the night shifts would be associated with reduction in risk of cardiovascular diseases. This possibility needs to be tested in a prospective study. Methodologically, ABPM is shown to be a good tool in detecting the effects of night work. We can thus use ABPM more extensively at medical examinations for shift workers.

In our studies, sleep disturbance, increased daytime sleepiness, and fatigue appeared to be more prevalent among the workers on duty from midnight than among those working from 3:00. When worked late at night, it might thus be
desirable to schedule the start of night shifts at 3:00 at the earliest, so that the workers can have an increased opportunity to take a few hours sleep before the shift.

With the emerging of a 24-h society, workers on night shifts are increasing in Japan. The number of shift-working women and workers on the fixed night shifts, in particular, may rise remarkably. Those workers by definition experience difficulties due to shift work, but we realize that arranging conditions to secure a restful sleep is essential for their health and daily life. Occupational physicians have a vital role in assessing the health status of shift workers and in improving their work conditions.

References