Sleep Disorders

The effects of a 20-min nap before post-lunch dip

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Abstract   The effects of a 20-min nap before post-lunch dip were studied. The subjects participated in nap and no-nap conditions at intervals of 1 week. Their electroencephalogram (EEG) recordings of relaxed wakefulness, mood, performance, and self-rating of performance level were measured every 20 min from 10.00 to 18.00 h. For nap condition, the subjects went to bed at 12.20 h and were awakened after they slept for 20 min. The nap improved subjective sleepiness and self-rating of task performance, and suppressed EEG alpha activity. The results suggest a positive effect of a 20-min nap upon the maintenance of daytime arousal level.

Key words   arousal level, daytime sleepiness, electroencephalogram activity, nap, performance, post-lunch dip.

INTRODUCTION

It is well known that daytime sleepiness occurs and performance declines in the afternoon. Napping is one of the countermeasures of this 'post-lunch dip'.[1] While the afternoon nap has positive effects, such as refreshed mood and improved performance levels, it also has negative effects such as 'sleep inertia', or impaired alertness usually experienced upon waking.[2] These effects of napping are dependent on time of day, duration, and prior wakefulness.[3] We previously examined the effects of a short nap (20 min) in the early afternoon, and found positive effects upon the maintenance of vigilance level.[4] In the present study, we studied whether the 20 min nap at noon (i.e. before post-lunch dip) had positive effects upon behavioral, subjective and physiological indices.

METHODS

Ten university students (aged 20–22 years) participated in the study. Preliminary assessment was made of sleep habit inventory,[5] and it reported usual sleep–wake habits. No subject had habitual napping or smoking. They participated in nap and no-nap conditions at intervals of 1 week. After a nocturnal sleep recording (00.00–08.00 h), the test batteries were performed every 20 min from 10.00 to 18.00 h. These batteries included (i) EEG recordings (Fz, Cz, Pz and Oz) of relaxed wakefulness with eye opened, (ii) mood check via visual analog scale (sleepiness and fatigue), (iii) computer tasks (logical reasoning, alphanumeric detection, addition, and auditory vigilance), and (iv) self-rating for the task performance. For the nap condition, the subjects went to bed at 12.20 h and were awakened when 20 min had elapsed from the onset of sleep stage 1. For the no-nap condition, the subjects took a rest without sleep at the same time of the nap condition.

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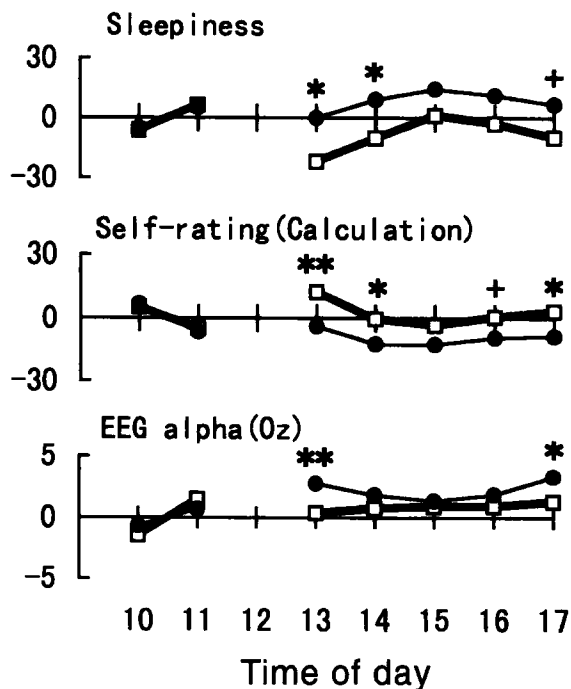
RESULTS

Two way analysis of variance [2 (nap or no-nap) × 7 (time in hours)] with repeated measures were performed for hourly means (3 × 20-min sessions) of mood (sleepiness and fatigue), performance (reaction time and percentage correct of the computer tasks), self-rating for task performance, and EEG alpha band power (7.6–13.4 Hz). Neither main effect nor interaction was significant for reaction time and percentage correct of the computer tasks. Thus, the 20-min nap before post-lunch dip did not improve task performance, however, it had a positive effects upon the subjective sleepiness, self-rating of task performance, and EEG arousal level (Fig. 1). The main effect of time was significant for subjective sleepiness [$F(4,35) = 15.03$, $P < 0.05$]. The post-hoc comparison revealed that subjective sleepiness was significantly lowered for the nap condition in comparison with the no-nap condition at 13.00 and 14.00 h. Also the main effect of both time and nap were observed for self-rating of calculation task [time: $F(4,32) = 4.32$, $P < 0.01$; nap: $F(1,9) = 7.13$, $P < 0.05$], and Oz-EEG alpha band power [time: $F(2,19) = 7.15$, $P < 0.01$; nap: $F(1,9) = 6.34$, $P < 0.05$]. The self-rating of their performance level was heightened for the nap condition when sleepiness was improved. The Oz-EEG alpha band power was constantly maintained from morning to late afternoon for the nap condition, although it increased at 13.00 and 17.00 h for the no-nap condition.

DISCUSSION

The positive effects of the 20-min nap upon performance level were previously observed under the condition of restricted night sleep[6,7] and 64 h of continuous work.[8] After a usual night's sleep, the 20-min nap during early afternoon also improved performance level.[4,9] The present results showed that the 20-min nap before post-lunch dip improved sleepiness, subjective ratings of performance level and EEG arousal level, but it did not enhance performance level. These discrepancies

Sleepiness

Self-rating (Calculation)

EEG alpha (Oz)

Figure 1. Hourly means of sleepiness, self-rating of calculation task, and Oz-EEG alpha band power ($n = 10$). The data were normalized via mean scores at 10.00 and 11.00 h set to 0 level. $^{**}P < 0.01$, $^*P < 0.05$, $+ P < 0.1$.

of the results between the previous studies and present study might be explained by the arousal level when napped. In the previous study, the subjects took a nap when their sleepiness level was relatively high due to reduced night sleep or post-lunch dip, but it was not high in the present study because the

subjects slept before post-lunch dip. Chronobiological aspects of arousal level should be further considered to examine the effects of short nap.

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Sleep Disorders

Prolonged polysomnography in a case with recurrent hypersomnia

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Abstract　　　　An 18-year-old male patient with recurrent hypersomnia (RH) was evaluated using prolonged polysomnography (PSG). During symptomatic period (SMP), the patient showed both 'dissociated stage REM' (DREM), REM sleep without muscle atonia and 'dissociated stage 1' (DSt-1), and stage 1 sleep with rapid eye movement. These stages were observed in the morning or following daytime record. They decreased during asymptomatic period (ASMP). It has been said that RH is caused by dysfunction of the hypothalamus and midbrain limbic system. The present result suggests also that RH involves dysfunction of the brain stem.

Key words　　　　dissociated stage REM, dissociated stage 1 prolonged polysomnography, recurrent hypersomnia.