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Review

Sleep hygiene and medicine in Japan

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1. Preface

Epidemiological study on sleep habit done by the Japan Health Promotion and Fitness Foundation and National Institute of Public Health together with National Institute of Mental Health revealed that sleep duration per night between 6 and 7 hours was most frequently (31%) observed in the Japanese adult population[1]. Sleep duration considered as sufficient by the largest population (40%) was also between 6 and 7 hours. Interestingly, even shorter periods of 5–6 hours were considered sufficient by 15.5%. Therefore, in adults, sleep duration considered between 6 and 7 hours seems to be a suitable length of sleep and less than 6 hours sleep may be insufficient. In the study, 21.4% of the subjects indicated some difficulties in their daily life. Waking up during sleep was the most common complaint. Furthermore, sleep was obviously more difficult in the elderly. Exercise habits correlated most with sleep problems. Since waking up during sleep correlated negatively the most, exercise habits are likely to help prevent or correct sleep problems, in particular waking up during sleep. About 6% of subjects replied that they used to take alcohol or sleeping pills to facilitate sleep. The study done by the National Institute of Health showed that about one out of 20 subjects took sleeping pills and the frequency of drug use was higher as age increased. In the age range between 70 and 79, 8.7% of all males and 11.7% of all females took sleeping pills, while in the age range above 80, 10.2% of all males and 21.8% of all females did. These findings suggest that middle aged men prefer alcohol, and middle aged women sleeping pills.

The most frequent sleep disorder is psychophysiological insomnia. However, recently two other types of sleep disorders are being focused on; they are sleep rhythm disorders and sleep apnea. The former is characteristic with the difficulty in sleeping during the desired time of day, although such cases can sleep well when they are allowed to sleep whenever they like. This disables them going to their jobs or school. The latter disorder, sleep apnea, adversely affects the cardiovascular system in the long course[2]. For both disorders, several treatments have recently been developed. Bright light therapy, melatonin, and vitamin B12 therapy have been developed for rhythm disorders, while continuous positive airway pressure (CPAP) is the most popular way to treat sleep apnea. Other treatments developed include hormone therapy, and surgery.

2. Establishment of somnology[3, 4]

Recently, the Science Council of Japan (SCJ) published a report entitled "Proposal regarding the establishment of the scientific field of somnology in Japan and promotion of its study". The aim of this proposal concerning somnology was to integrate the various sleep-related studies that are currently conducted in many different fields and to create an academic system for the science.

For the newly proposed field of somnology, the areas in which sleep-related studies are conducted comprise three major realms. The first is "sleep science" in which basic studies are implemented involving molecular biology and genetic studies. The second is "sleep medicine" which attempts to clinically treat hyposomnia or hypersomnia. Because dentistry and pharmacology are related to this area, this field would be better to be called "sleep medicine-dentistry-pharmacology". And the third is "sleep sociology" which attempts to treat social problems related to sleep, such as those regarding the so-called 'night-based society', shift work ,and accidents resulting from shift work. The above represents the content of the proposal by the SCJ in which these three

major study fields are integrated under the main theme of "sleep" and based on which an academic system is structured. The purpose of this proposal is: to further promote sleep studies in a way that transcends each specific field, to apply and reflect the results of such studies in society, to protect the nation from sleep disorders, to improve people's overall health, to prevent accident such as those caused by drowsiness, and to eventually increase relevant economic effects produced by better sleep habits.

Furthermore, the Ministry of Health, Labor and Welfare also recently disclosed and is disseminating 7 principles for good sleep. They recommend people to enjoy daily life by taking sufficient and sound sleep. To do so, they are suggested to keep sleep-wake cycle regular, to reset their biological rhythm by light and to overcome sleepiness in the afternoon by taking short nap and to avoid alcohol use as sleep inducer. It warned to see a doctor if people has serious problems on aleep even after they obey the recommendation of the 7 principles for good sleep.

3. Activity of Japanese Society of Sleep Research

Sleep research and communication among researchers has been actively conducted in Japan. In April 2004, the 29th annual meeting of the Japanese Society for Sleep Research was successfully held in Tokyo. Two plenary lectures were exciting and enlightening. Six symposia were rewarding to the participants. This was the first time in the history of the annual meeting that more than 100 posters were presented and more than 1000 researchers participated in the meeting. Recently the number of society members markedly increased to 1700, and the area of specialty of members is now much broader from basic researcher to engineers. The clinical research field is also more diverse, such as psychiatry, internal medicine, respiratory, otolaryngology, oral surgery, dentists, etc., indicating that somnology is indeed a multidisciplinary research field receiving growing attention. Topics discussed in the meeting cover various aspects from sleep science, sleep medicine, to sleep sociology.

The society launched a new Society journal called Sleep and Biological Rhythm two years ago. Its quality is getting higher as the volume advances. A lot of intresting papers are published from both Japan and foreign countries. In that sense the journal are becoming really international. It would be recommendable that Japanese Society has own international journal to provide original findings and information from Japan. Japanese scientists tend to submit their high quality papers in high rank international journal, in stead of new Japanese journal. It would be important for Japanese scientists to make effort to raise good internatioal journal published in Japan.

4. Sleep problems to be solved

There are important problems on sleep which remain to be solved. In my humble opinion, one of the most important issues would be resolving sleep shortage. Our society, active round the clock, is shortening sleep hours. Such lack of sleep may cause serious damage to both the physical and mental health of children. This problem must be recognized by society to prevent health problems in children. Sleep researchers must also pay more attention to this problem and propose solutions to the community.

An epidemiological survey conducted extensively in Japan in 1996 revealed that one out of five adults in the country suffers from some forms of sleep disorder. Meanwhile, according to one hypothesis, the lifestyle habits of adults are formed mostly during puberty. Therefore, in order to climinate the problem of sleep disorders, people must begin to take care of their sleep hygiene during puberty. It is also known that one pattern of sleep disorder called 'sleep-awake rhythm disorder' begins to appear when people are in their mid-teens, or a certain time from the onsey of puberty to the beginning of young adulthood. In light of the above, people's lifestyle behaviors during puberty are very important.

The "National Time Use Survey" implemented by the NHK Broadcasting Culture Research Institute every five years since 1969 shows clearly that lifestyle of Japanese people have shifted more and more towards nighttime-focused activities[5]. In 1960, about 90% of the population went to bed at 11 : 00 pm, yet this figure decreased to around 51% by the year 2000. Also, in 1960 about 69% of the people in Japan got up at 6 : 00am, while in 2000 approx. 60% of people were still asleep at this hour. Although a reduction in sleep

time was seen across the broad for all age groups, this tendency was shown most significantly in the generartion aged 16–19. Compared with other countires, young people in Japan sleep a shorter amount of hours, and young Japanese in the pubescent years get 30 min less sleep than youngsters in European countries. The optimal situation is to make sure that pubescent children, who represent the future generation, get a sufficient amount of good quality sleep each night so that they can mature into mentally and physically healthy adults.

Regarding the sleep problems seen among junior-high school students, a survey was conducted recently by a research organization at the National Instituite of Mental Health of the National Center of Neurology and Psychiatry, and this survey is discussed herein[6–8]. The organization implemented a survey on the sleep habits of students at two junior high schools in Okinawa Prefecture during summer vacation. The survey targeted a total of 527 male and female students. The reason why summer vacation was selected was because there were no restrictions regarding what time the students had to wake up, in contrast to during the school term, and the survey could thus be conducted under relatively less restrictive conditions. They implemented a questionnair-type survey which asked what time the students went to bed, what time they got up, the student's subjective evaluation of their sleep, how they felt when they woke up, whether they consumed breakfast, their amount of daytime drowsiness, their level of concentration ability, and others questions over a period that lasted for about two months.

The results were as follows. The time at which the students went to bed ranged from 9:30pm to 3:00am, and the percentage of students who went to bed after midnight was 12.8% for the first-grade students, 19.8% for the second-grade students, and 38.6% for the third-grade students. On the other hand, the times that they woke up ranged from 4:00am to 8:00pm and the average was 8:00am. Their wakeup times correlated positively with the times at which they went to bed, and 7% of all students regularly got a short amount of sleep lasting six hours or less. Students who went to bed late woke up at later time with a longer amount of sleep time.

A comparison of "sleep health risk" was conducted among three different sets of students: 1) those who went to bed by midnight ('non-delayed sleep group') and those who went to bed at the latest tie (25%) ('delayed sleep group'); 2) those who got up before 9:00am ('non-delayed wakeup group') and those who got six or less hours of sleep ('reduced sleep-time group') and those who got six or more hours of sleep ('normal sleep-time group'). Consequently, the results shown in Table 1 were obtained. The 'sleep health risk' compromises a score which results from the integrated evaluation of various factors, including disorders related to maintaining sleep function, such as frequent awakening, excessively deep sleep, waking up too early, parasomnia, sleep apnea, difficulty in waking up, and hypnagogic disorder.

Table 1 Comparison among the Sets of Students Grouped according to the Time They Go to Sleep. The Time They Get Up and the Duration of Their Sleep[6]

Items	Time they went to sleep		Time they got up		Sleep time	
	Delayed group	Non-delayed group	Delayed group	Non-delayed group	Reduction group	Normal group
Feeling unwell when they wake up	37.1	20.5**	35.2	21.7**	26.9	23.4
Irregular consumption of breakfast	51.2	19.7**	57.5	19.5**	30.8	16.2**
Irregular bowel movements	33.1	29.3	33.7	29.3	33.1	24.0
Intolerable daytime sleepiness	4.8	2.8	3.8	3.1	6.2	3.1
Feeling of insufficient sleep	60.0	62.1	49.5	64.6**	79.2	61.5**
Complaints of sleep problems	17.1	10.9#	14.4	11.9	15.3	7.0*

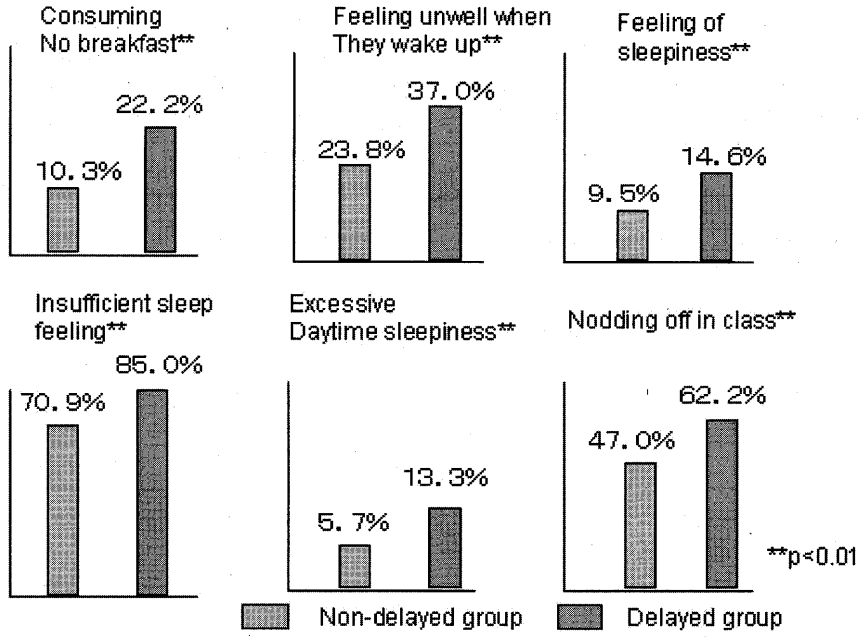
**$p<0.01$, *$p<0.5$, #$p<0.1$
(Cited from Tanaka H et al: Mental Health Research 46: 65–71, 2000)

The 'delayed sleep group' tended to feel unwell when they woke up and consumed breakfast irregularly, and they manifested many sleep problems such as physically feeling they didn't get a sufficient amount of sleep at night and experiencing daytime drowsiness. A similar tendency was seen in the 'reduced sleeptime group'. Meanwhile, the 'delayed wakeup group' who were thought to have gotten longer hours of sleep also said they felt unwell when they woke up and were often unable to eat breakfast and felt they didn't get sufficient amount of sleep. The group who slept irregularly showed a higher level of sleep health risk and were unable to fall asleep easily and could not get up early in the morning, in comparison with the group who slept regularly.

As mentioned earlier, this survey was carried out during summer vacation when there were no restrictions in place as to what time the students had to wake up. In other words, they could sleep as much as they wanted. Even under such conditions, differences were still seen regarding the time they went to sleep and the regularity of their sleep. Thus, an increase in sleep health risk and 'feeling poorly during the daytime' are assumed to result from lowered sleep quality. In the group who went to bed at later times at night, there were many students who slept and got up at irregular times.

The same research organization also conducted another study which examined sleep health risk of junior-high school students and then compared the level of such risks during summer vacation and the school term. In summer vacation, students went to bed and woke up at later times and their sleep health risk was significantly higher. The students who manifested a high level of sleep health risk during the school term and during summer vacation tended to have irregular sleep habits and they went to bed at later times. Moreover, a subsequent survey conducted which targeted an increased number of subjects during the school term confirmed that later times of going to sleep caused a reduction in the amount of sleep time and consequently caused a deterioration in overall sleep health (Fig. 1).

Taking these findings into consideration, it can be said that going to sleep at later times, irregular sleep habits, and not consuming breakfast are associated strongly with a deterioration of sleep health. Thus, it is important for people to acquire regular sleeping and eating habits on a routine basis. Students' sleep time is restricted by the time at which they



(Cited from Arakawa M et al : School Health Research 43 ; 388–398, 2001)

Fig. 1 Comparisons between the students who went to sleep at midnight or later (Delayed group) and those who went to sleep before midnight (Non-delayed group)[8]

have to be at school the following morning, and the time they must go to bed is almost fixed. It is therefore necessary for students to receive appropriate and adequate instruction regarding the importance of going to bed at an earlier time.

Another study pointed out that the reason why student go to sleep at later times was because they often slept for short periods during the day, i.e. they took naps[9]. According to this study, about half of all junior and senior-high school students surveyed said they often take naps. Because they take brief naps at home after returning from school, the timing of the naps occurs at a relatively late time during the day, between 5:00–9:00pm in many cases. These brief naps taken at a later time during the day cause the students to go to bed at a later hour of night. And it was found that the later they go to sleep, the stronger feelings of irritation they experience during daytime (Fig. 2). Besides these findings, it was also shown that students experience a greater incidence of problems such as anxiety and depression when they go to sleep at later times and take frequent naps.

Because school starts at affixed time for junior and senior-high school students, it is considered that there are no major individual differences in the time they get up. Thus, it is assumed that the total sleep time becomes longer for students who take naps. However, the fact that students who take naps are more prone to feeling irritated and have more problems indicates that the overall quality of sleep is important and that there are certain hours during the 24-hour cycle which are more suitable for sleep.

Work shifts are also another problem. More than six million people are said to be on work shifts in Japan. Work shift causes many health problems to many, but yet it is essential for helping society to function as well as ensuring security in the community. It is therefore urgent that we find ways to minimize adverse effects of work shifts.

The two issues above are just but a few examples. It is time to promote sleep research to maintain our well-being.

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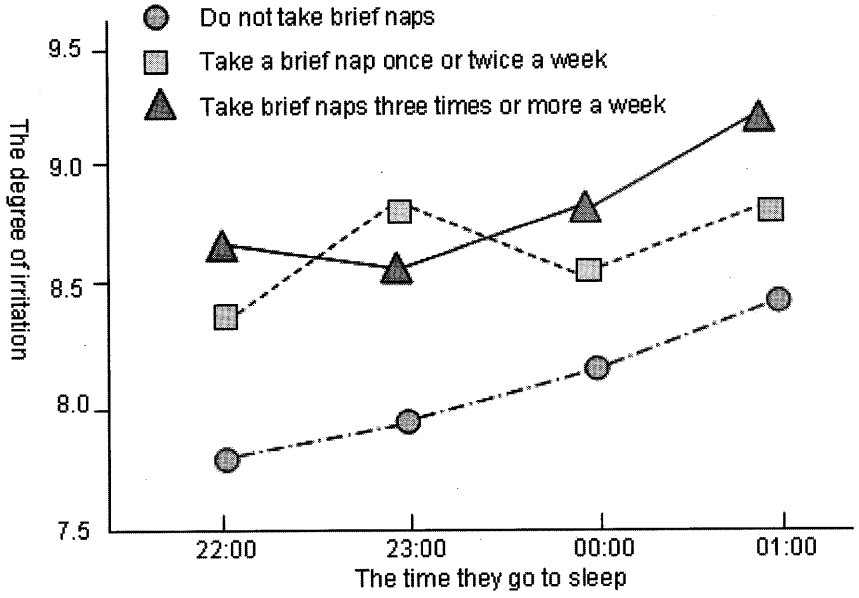

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Fig. 2 The relationship between taking brief naps and experiencing irritation during the day[9]

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