Original article

The relationship of sleep quality and sleep hygiene with fatigability of resident physicians in a university hospital

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Objective To evaluate the association of sleep quality and sleep hygiene with fatigability of resident physicians.

Methods A cross-sectional study was conducted using questionnaires to collect data from resident physicians from different departments in the Faculty of Medicine, Chiang Mai University, Thailand. Survey questions included demographic data and information regarding sleep and periods on duty. In addition, the questionnaire sets included the Pittsburg Sleep Quality Index (PSQI), the Sleep Hygiene Index (SHI), and the Stanford Sleepiness Scale (SSS).

Results Of the 429 questionnaires distributed, 223 sets were returned (51.98%). The average hours of sleep per day when an overnight shift, time required to fall asleep, and the number of overnight shifts per month were 6.62 hours, 15.80 minutes, and 9.46 shifts, respectively. During an overnight duty shift, the average number of times a resident was awakened and the length of the actual sleep period were 3.67 times and 4.12 hours, respectively. The average scores of PSQI, SHI, and SSS while not on a shift and SSS while on a shift were 5.06±2.66, 30.96±8.27, 2.12±1.29, and 3.71±1.74, respectively. Significant relationships between sleep quality, sleep hygiene, and fatigability both before and after a shift were identified (p<0.05). Sleep quality and sleep hygiene had a significant effect on the fatigability of the resident physicians (SSS) after a period of being on duty. Each 1 point increase in PSQI resulted in a 0.25 point increase in SSS (95%CI 0.13-0.31, p<0.01). Similarly, a 1 point increase in SHI was accompanied by a 0.1 increase in SSS (95%CI 0.02-0.8, p<0.01).

Hours of sleep per day when not working on a shift, the number of overnight shifts worked each month, and the number of hours worked per shift were found to have no relationship with sleep quality, sleep hygiene, or fatigability. Nevertheless, the number of incidents of being awakened and the average actual sleep time were significantly associated with sleep quality, sleep hygiene, and fatigability after shift work (p<0.05).

Conclusion Sleep quality and sleep hygiene, both before and after an overnight duty shift, are significantly related with fatigability. Resident physicians who have both good sleep quality and good sleep hygiene have reduced fatigability. **Chiang Mai Medical Journal 2019;58(1):31-41.**

Keywords: sleep quality, sleep hygiene, fatigability, resident physicians

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Introduction

Sleep is very important in the life of a human being as it plays an essential role in the well-being of the body, the emotions, and the mind. Good sleep hygiene results in more effective sleep (1). The definition of "normal sleep" varies depending on the research and the individual researcher. Periods of sleep can be divided into two stages: non-rapid eye movement (NREM) and rapid eye movement (REM). NREM sleep during can be further divided into four sub-stages, of which stages 3 and 4 are very important for the brain and for the regeneration of all the parts of the body (2). In addition, during REM sleep, which is characterized by quick eye movements and activity of the sympathetic autonomic nervous system, there is an increase in cerebral blood flow as well as blood flow to other organs (3). The completion of each of these stages is very important for a healthy body and mind.

The study of the relationship between the quantity and quality of sleep found that health, well-being, and good sleep were more closely associated with sleep quality than sleep duration (4). Poor sleep quality affects both the body and the mind. It results in the body having less energy, a weaker immune system, reduced ability to restore, damaged body parts, and defective disorders. It also leads to a decrease in tolerance, self-constraint, and ability to concentrate which can easily lead to mistakes, carelessness, and even accidents. In the US, there have been attempts to implement policies that promote and focus attention on the quality of sleep and appropriate sleep behavior. Those policies are the result of a growing awareness of the negative effects of inadequate sleep including increased potential for disease (5). These policies reflect the findings of several studies which revealed that good sleep behavior based on good sleep hygiene can improve the quality of sleep (1, 6-11).

Sleep hygiene as defined by Maston, Bryson, and Corwyn (2006) refers to "practicing behaviors that facilitate sleep and avoiding behaviors that interfere with sleep"(6). It includes both physical factors and environmental factors which can affect sleep quality. Quality sleep is essential for learning, memorizing, processing, and analyzing for applications (12). Resident physicians during their medical training have to perform duties as a doctor which involve direct care of patients as well as being on duty in addition to their role as students, i.e., studying in a specific field. Fulfilling those two roles puts resident physicians at risk of inappropriate sleep behavior, especially sleep deprivation and being woken up during sleep (13). Both sleep deprivation and being awoken affects the thinking system and the motor system of the body and can result in both acute and chronic symptoms (14,15). That also increases the risk of motor vehicle accidents (16), negatively affects emotions (15,17), causes added stress (18,19), and negatively impacts relationships with other people, both in society and within the family (19, 20). It also has a deleterious effect on the ability to study both theoretical (21-23) and practical material (15,24,25).

Resident physicians suffering from sleep deprivation or who have been on overnight duty run an increased risk of making mistakes and having a diminished ability to respond to situations while on duty. They have to try to compensate by making an extra effort to be careful, unlike resident physicians who have had normal sleep (26,27). In response, the Accreditation Council for Graduate Medical Education (ACGME) proposed a practical rest schedule for resident physicians. Resident physicians can be required to work a maximum of 80 hours per week and must have one day off. Each shift, including hours of night duty, must not exceed 24 hours, and there must be at least a 10 hour break before the next shift. In addition, three consecutive night shifts is not allowed (28).

Objective

To explore sleep quality and sleep hygiene and to determine the relationship of sleep quality and sleep hygiene with fatigability both before and after being on duty in resident physicians at Maharaj Nakorn Chiang Mai Hospital.

Methods

Research methodology

This descriptive observational study was conducted using a questionnaire-based survey of interns and the resident physicians at the Faculty of Medicine, Chiang Mai University during August 2011 to October 2011.

Study population

The study population consisted interns and 1st through 6th year resident physicians in the departments of Anatomy, Pediatrics, Ophthalmology, Psychiatry, Forensic Medicine, Pathology, Pharmacology, Radiology, Anesthesiology, Family Medicine, Emergency Medicine, Rehabilitation, Surgery, Physiology, Obstetrics and Gynecology, Otolaryngology, Internal Medicine, and Orthopedics at Maharaj Nakorn Chiang Mai Hospital. The total population (N) was 429 persons. The anticipated questionnaire return rate was 80%, or 344 persons. Consent was given by all participants. Individuals with a congenital disease conforming to the diagnosis criteria for sleep disorder ICSD 2001(29,30) were excluded from the study.

Data collection

The questionnaire consisted of five parts. The first part included demographic questions about the individual. The second part included questions about normal sleep and duty hours. The third part was the Pittsburg Sleep Quality Index (PSQI), the fourth part was the Sleep Hygiene Index (SHI), and the last part was the Stanford Sleepiness Scale (SSS).

The questionnaires were distributed to the departments of Anatomy, Pediatrics, Ophthalmology, Psychiatry, Forensic Medicine, Pathology, Pharmacology, Radiology, Anesthesiology, Family Medicine, Emergency Medicine, Rehabilitation, Surgery, Physiology, Obstetrics and Gynecology, Otolaryngology, Internal Medicine, and Orthopedics.

Demographic data included gender, age, field of study, year of study, congenital diseases, and personal drug use including medication to help stay awake during long shifts. Sleep and duty history questions included average sleep hours per night, number of shifts per month, hours per shift, number of incidents of being awakened per shift, time to onset of sleep, and hours of sleep per shift.

The Pittsburg Sleep Quality Index (PSQI) was used to evaluate sleep quality during the preceding 28 to 30 days. The PSQI was comprised of seven sections and included subjects such as sleep duration, sleep efficiency, disturbances to sleep, quality of sleep, latency of sleep onset as well as with sleeping, drug use, and daytime dysfunction. The questionnaire consisted of 19 self-evaluation items and five items which were to be evaluated by a bedfellow or a roommate. The self-evaluation included 14 questions with four choices each. Four additional questions with score levels from 0 to 21, with a higher score indicating poor quality of sleep and a cut-off score of 5 points (31).

The Sleep Hygiene Index (SHI) was used to evaluate sleep hygiene. That index consisted of 13 items to evaluate sleep hygiene, each with five levels, i.e., always [5], frequently [4], sometimes [3], rarely [2], and never [1] (29,30,32). The reliability of this instrument was 0.66 and it possessed equally good test–retest reliability (r=0.71) (29, 30,32). An SHI score of between 13 and 65 indicates inappropriate sleep behavior as regards sleep hygiene and inadequate sleep.

The Stanford Sleepiness Scale (SSS) was used to evaluate fatigability both before and after overnight duty. The score indicates the level of the attentiveness on a scale of 1 to 7, with scores higher than 3 indicating a need for sleep (X2 r=16.51, $p<0.05$)(33).

The study was approved by the committee of ethics at the Faculty of Medicine, Chiang Mai University.

Statistical analysis

A comparative analysis was done to examine the relationship of the PSQI, SHI, and SSS scores using Pearson's correlation and Gaussian regression. The demographic data were studied using descriptive statistics. Chi-square was used with categorical data and statistically significant difference

was accepted at *p*-values less than 0.05. Statistical analysis was done using Stata/SE 11.0.

Results

Of the 429 questionnaires distributed, 224 were returned (52.21%) of which 223 were entirely completed for a return rate of 51.98%. Of the participants, 93 were male (41.7%), and 130 were female (58.3%). The year of study and department of the respondents are shown in Charts 1 and 2. There were 179 participants (80.3%) with no congenital diseases, 30 (13.4%) with allergies, 5 with asthma (2.2%), 2 with sinusitis (0.9%), and 14 with other diseases (6.3%) as shown in Chart 3. One participant was affected with depression (0.4%), while none of the participants had sleep disorders. Most (213 or 95.5%) did not use any drugs regularly. The most frequently used drug was antihistamine (3 persons or 2.7%), followed by proton pump inhibitors (2 persons or 2.7%), and other drugs (3 persons or 1.3%).

The average hours of sleep on days off was 6.63±0.99 and the average number of overnight shifts per month was 9.46±6.14. The average number of hours per shift was15.97±9.28. The average number of incidents of being awakened during a shift was 3.67±3.11. The average time to onset of sleep was 22.21±19.8 min. The average actual hours of sleep during an overnight shift was 4.12±1.68. The most common time for going to bed was 23:30 (range 21:00 p.m. to 02:00 a.m.), and the most common time for getting up was 06:00 (range 03:00 a.m. to 09:00 a.m.) as shown in Table 1.

The average PSQI score for all participants was 5.06±2.66 and the average SHI was 30.96±8.27. The average SSS score while not on an overnight shift and on an overnight shift were 2.12±1.29 and 3.71±1.74, respectively. The highest PSQI score was recorded by the Department of Anatomy (7.33) and the lowest by the Department of Pathology (2.50). The highest average SHI score came from the Department of Orthopedics (37.85), whereas the lowest was registered by the Department of Pathology (22.67 points). The highest average SSS score while overnight duty was recorded by the Department of Pediatrics (4.54), and the lowest came from the Department of Family Medicine (1.50). The highest average SSS score while on duty was registered by the Department of Anatomy (4.67) and the lowest was recorded by the Department of Rehabilitation (2.00), as shown in Table 2.

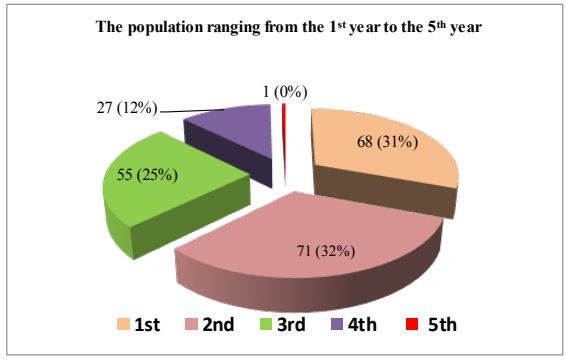


Chart 1. Participants by year of residency

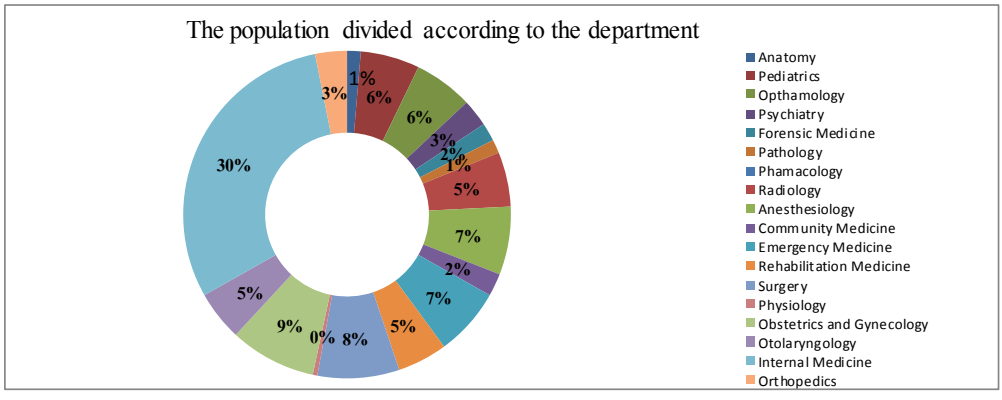


Chart 2. Paricipants by hospital department

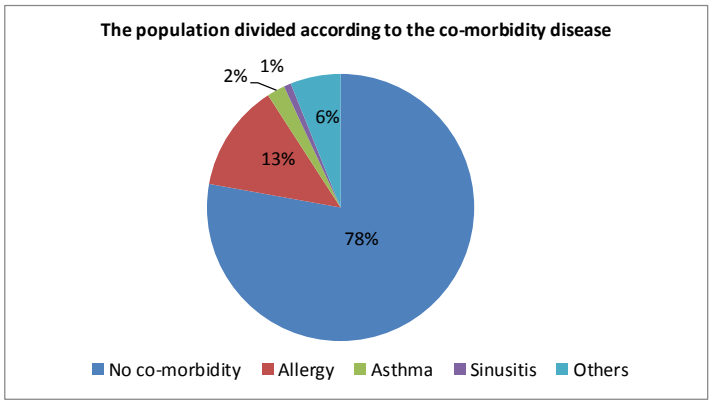


Chart 3. Participants by co-morbidity

Regarding the relationship of sleep quality and sleep hygiene with fatigability, both before and after being on duty. It was determined that the data distribution of sleep quality, sleep hygiene and fatigability were non-parametric, so Pearson's correlation was used to calculate the relationship of those factors. A significant relationship between both sleep quality and sleep hygiene with fatigability was found, both before and after being on duty ($p<0.05$), as shown in Table 3 and Graph 1. However, the relationship between sleep hygiene and fatigability was not significant either before or after being on duty ($p=0.46$), as with the relationship between the two factors found in the Department of Anatomy where there were the most participants, even for the Department of Anatomy, as shown in Table 4.

The relationship of sleep quality (PSQI) and sleep hygiene (SHI) with fatigability (SSS) after being on overnight duty was analyzed using Gaussian regression (Graph 1). All relationships were found to be statistically significant. The equations are as follows:

Equation 1: SSS=2.62+0.25 PSQI (95%CI 0.13-0.31; $p<0.01$)

Equation 2: SSS=2.22+0.05 SHI (95%CI 0.02 -0.8; $p<0.01$)

Equation 3: SSS=2.04+0.03 SHI + 0.2 PSQI ($p<0.01$)

For example, equation 1 shows that if the PSQI score were 1, the SSS score would be expected to be 2.87 and a 1 point in the PSQI score would result in a 0.25 point increase in the SSS score. Similarly, for equation 2, if the SHI score were 1, the expected SSS would be 2.27 and an increase by 1 point in the SHI score would result in an increase of 0.1 point in the SSS score. From equation 3, if the scores of both SHI and PSQI were 1, it would result in an an anticipated SSS score of 2.27. SSS scores would thus increase in accordance with increases in the SHI and PSQI scores. In addition, the relationship between sleep quality and sleep hygiene was found to be statistically significant ($p<0.01$) as shown in Graph 1.

Analysis of the relationship among sleep quality, sleep hygiene, and fatigability after being on

Table 1. Sleep Data

	Mean	Standard deviation	Min.	Max.
Hours of sleep during an overnight shift	6.63	0.99	4	10
Overnight shifts per month	9.46	6.14	0	31
Hours per shift	15.97	9.28	0	24
Times wakened per shift	3.67	3.11	0	22.5
Time to sleep onset (min)	22.21	19.8	0	150
Actual sleep hours during an overnight shift (h/duty)	4.12	1.68	0	10

Table 2. PSQI, SSS, and SHI scores by department

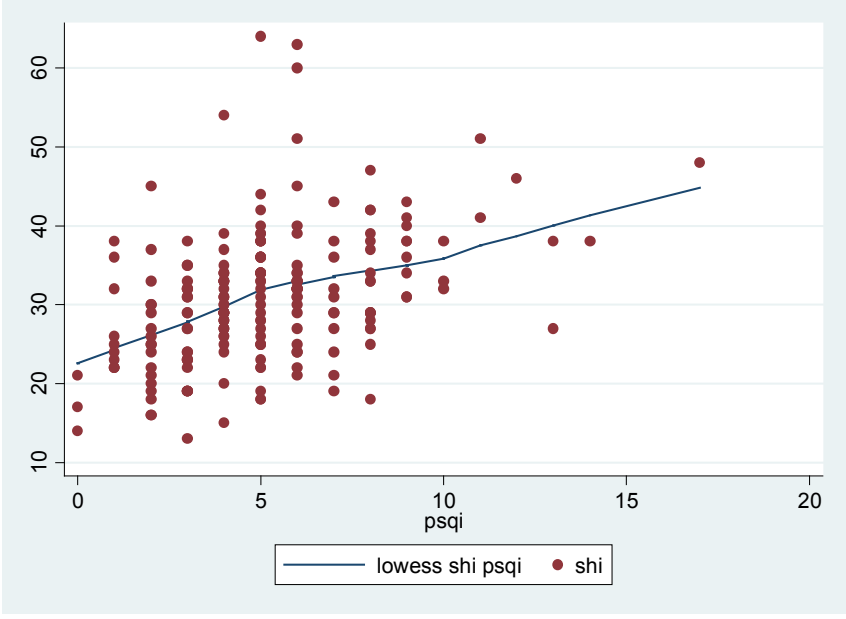
Department	Participants (n)	PSQI (n=211)	SHI (n=217)	SSS – not on duty (n=215)	SSS – on duty (n=211)
Anatomy	3	7.33+1.15 (6–8)	34.67+6.81 (27–40)	2.33+0.58 (2–3)	4.67+2.52 (2–7)
Pediatrics	13	6.46+3.43 (2–13)	33.31+8.40 (18–47)	2.15+1.40 (1–6)	4.54+2.22 (2–8)
Ophthalmology	13	6.08+4.33 (0–17)	29.54+9.93 (15–48)	2.83+1.90 (1–7)	3.92+1.93 (1–7)
Psychiatry	6	3.17+2.79 (0–6)	25.33+9.05 (14–39)	1.50+0.84 (1–3)	2.83+2.56 (1–7)
Forensic Medicine	4	5.00+2.83 (3–7)	28.00+10.23 (13–36)	2.75+0.50 (2-3)	4.50+1.29 (3–6)
Pathology	3	2.50+0.71 (2–3)	24.67+1.15 (24–26)	3.33+3.21 (1–7)	-
Radiology	12	5.50+2.11 (2–10)	30.45+6.77 (18–39)	1.90+1.52 (1–6)	2.70+2.16 (1–7)
Anesthesiology	14	4.36+1.98 (1–8)	30.43+10.38 (22–64)	2.57+1.28 (1–6)	4.14+1.41 (2–6)
Family Medicine	5	3.40+2.97 (0–8)	26.75+8.84 (16–34)	1.50+0.58 (1–2)	3.50+2.08 (1–6)
Emergency Medicine	15	5.27+2.83 (1–11)	38.80+6.21 (29–54)	2.78+1.80 (1–7)	4.43+1.78 (1–7)
Rehabilitation	11	2.64+1.80 (0–6)	28.00+6.07 (17–36)	1.64+0.67 (1–3)	2.00+0.89 (1–3)
Surgery	18	4.78+2.60 (2–11)	29.72+8.76 (13–51)	1.65+0.78 (1–3)	3.22+1.48 (1–6)
Obstetrics and Gynecology	19	5.74+2.42 (1–10)	33.50+5.19 (21–41)	2.10+1.29 (1–7)	4.26+1.52 (2–8)
Physiology	1	5.00	19.00	2.00	2.00
Otolaryngology	11	4.73+1.95 (2–9)	30.70+11.50 (19–60)	2.82+1.83 (1–8)	4.09+1.97 (1–8)
Internal Medicine	63	5.27+2.40 (1–14)	29.88+6.53 (16–51)	1.89+0.95 (1–7)	3.55+1.40 (1–7)
Orthopedics	7	4.86+1.34 (2–6)	37.86+12.35 (25–63)	1.71+0.76 (1–3)	4.43+1.90 (2–7)
Total	223	5.06+2.66 (0–17)	30.96+8.27 (13–64)	2.12+1.29 (1–8)	3.71+1.74 (1–8)

Table 3. Relationship of sleep quality (PSQI) and sleep hygiene (SHI) with fatigability (SSS) before and after being on duty (Pearson's correlation)

	SSS-not on duty		SSS-on duty	
	Correlation	*p*-value	Correlation	*p*-value
PSQI	0.197	*p=0.005*	0.325	*p<0.001*
SHI	0.138	*p=0.46*	0.235	*p=0.001*

Table 4. Relationship of sleep quality (PSQI) and sleep hygiene (SHI) with fatigability (SSS) before and after being on duty in the Department of Anatomy (Pearson's Correlation) in the Internal Medicine Department

International Medicine Department	SSS-not on duty		SSS-on duty	
	Correlation	*p*-value	Correlation	*p*-value
PSQI	0.256	*p=0.045*	0.440	*p<0.001*
SHI	0.288	*p=0.02*	0.151	*p=0.237*



Graph 1. The relationship of sleep quality (PSQI) and sleep hygiene (SHI) with fatigability (SSS).

Table 5. Relationship between sleep quality (PSQI), sleep hygiene (SHI), and fatigability (SSS) after being on duty

Correlation total	PSQI (n=211)	SHI (n=217)	SSS after begin on duty (n=211)
Incidents of being awakened (times/shift)	*p*=0.02 0.226	*p*=0.06 0.199	*p*=<0.0001 0.319
Average actual sleep (h/shift)	*p*=0.02 -0.164	*p*=0.004 -0.204	*p*=<0.0001 -0.372

duty, the result revealed that there was found no relationship between the average hours of sleep on days without overnight duty, the number of overnight duty periods per month, and the duration of each duty period. However, there was a significant relationship between PSQI, SHI, and SSS scores and both number of incidents of being awakened and average actual hours of sleep (p=0.002, 0.006, <0.0001 and p=0.02, 0.004, <0.0001, respectively), as shown in Table 5.

Discussion

This study found that resident physicians had an average of 6.63 hours of sleep on a day with

no duty. That is in the appropriate average sleep range of 6-8 hours a night. However, the average number of duty periods was 9.46 per month, which is higher than that recommended by the Accreditation Council for Graduate Medical Education (ACGME) which specifies that physicians should not be on night duty for more than three consecutive nights (28). Moreover, the average actual sleeping time of 4.12 h per shift while on night duty is less than the recommended hours of proper sleep. As a result, the physicians were fatigued during the periods they were doing their work.

Based on scores from all the questionnaires, the Department of Anatomy had the highest average PSQI score, which indicates the poorest sleep quality. They also had high SSS-Duty had high SSS scores indicating a high level of fatigability at the end of an overnight duty period. On the other hand, the Department of Pathology recorded the lowest average PSQI score, which indicates the best sleep quality, and the lowest SHI score, which indicates the best sleep hygiene. Departments with PSQI scores ≥5 included Anatomy, Pediatrics, Ophthalmology, Forensic Medicine, Radiology, Emergency Medicine, Physiology, Obstetrics and Gynecology, and Internal Medicine, suggesting poor sleep quality. Fatigability while on duty indicated by SSS scores higher than 3 was found in the departments of Anatomy, Pediatrics, Ophthalmology, Psychiatry, Forensic Medicine, Radiology, Anesthesiology, Family Medicine, Emergency Medicine, Surgery, Physiology, Obstetrics and Gynecology, Otolaryngology, Internal Medicine, and Orthopedics. Additionally, SSS scores higher than 3 while not on duty were found in the Department of Pathology.

Overall, resident physicians in all departments at Maharaj Nakorn Chiang Mai Hospital were found to have poor sleep quality and poor sleep hygiene. The 17 departments together had an average PSQI score of 5.06±2.66 where scores higher than 5 indicate poor sleep quality and an average SHI score of 30.96±8.27.9 where scores between 13 and 65 indicate poor sleep hygiene. SSS scores while not on duty and while on duty were 2.12±1.29 and 3.71±1.74, respectively. Moreover, 15 out of the 17 departments has SSS scores higher than 3, suggesting excessive fatigability after overnight duty.

This study found a significant relationship between sleep quality, sleep hygiene, and fatigability both before and after being on overnight duty ($p<0.05$) with one exception: the relationship between sleep hygiene and fatigability before being on duty which was not statistically significant ($p=0.46$). Poor sleep hygiene (a high SHI score) was statistically significantly associated with poor sleep quality (a high PSQI score) and resulted in a high level of fatigability (high SSS score) both before and after being on duty. The study also investigated the relationship between sleep hygiene and fatigability before overnight duty, but found no significant association. The results of this research are in accord with the findings of several studies which suggest that good sleep behavior in conjunction with good sleep hygiene results in good sleep quality (1,6-11). Studies of the effect of sleep deprivation on fatigability and well-being of resident physicians have also shown that physicians with greater sleep deprivation or who worked a night shift were more likely to make mistakes and to have decreased competency during their shift, which means that they required more carefulness than those who had had normal sleep (26,27). Thus it is evident that sleep quality has a greater effect on fatigability after being on overnight duty than does sleep hygiene as indicated by the linear regression SSS=2.04+0.03 SHI +0.2 PSQI which means that a change of 1 unit of PSQI results in a greater change in SSS than a 1unit change of SHI.

Analysis of other factors related to sleep revealed no relationship between average sleep hours while not on duty, number of shifts per month, or hours per shift; however, the number of incidents of being awakened and average actual sleep hours after being on overnight duty were associated with sleep quality, sleep hygiene, and fatigability. This suggests that the main factor affecting sleep is the actual number of sleep hours, not the number of shifts or hours per shift. This

indicates physicians would have better sleep quality if they had sufficient sleep hours.

There are some limitations in this research. First, the PSQI, SHI, and SSS questionnaires were in English which might have resulted in some misunderstandings in interpretation. Also, the participants were required to recollect past events which might have caused discrepancies. This is the first mention of evaluation of emotions. There is no description of how you evaluated the emotions of the participants or the results of that evaluation.

The researchers would also like to suggest that this type of study, in addition to answering questions about doctors in a hospital setting, could also be a prototype for research of other occupations where sleep may be an issue, e.g., personnel working in shifts or required to be on duty for long hours. Furthermore, the study could be developed to be a more concrete standard for application in situations such as response measuring, aptitude testing, and physical efficiency evaluation, as well as for use by students to further develop and improve their learning and ability.

Conclusion

Resident physicians at Maharaj Nakorn Chiang Mai Hospital have fatigability while on overnight duty due to poor sleep quality and sleep hygiene. Sleep would be more effective and fatigability before and after being on duty would be reduced if the factors mentioned in this study were successfully addressed. Moreover, all the physicians should be made aware of the importance of sleep. That awareness might help promote both more effective learning, improved efficacy of medical care, and more effective use the human resources in an organization.

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ความสัมพันธ์ระหว่างคุณภาพการนอนหลับ และสุขอนามัยการนอนหลับต่อความอ่อนล้าของแพทย์ประจำบ้านในโรงพยาบาลมหาวิทยาลัย

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วัตถุประสงค์ เพื่อประเมินความสัมพันธ์ของคุณภาพการนอนหลับ (sleep quality) และสุขอนามัยการนอนหลับ (sleep hygiene) กับความอ่อนล้า (fatigability) ของแพทย์ประจำบ้านในโรงพยาบาลมหาราชนครเชียงใหม่

วิธีการ ศึกษาแบบตัดขวางโดยใช้แบบสอบถามแพทย์ใช้ทุนในแต่ละภาควิชาในคณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่ ประเทศไทย ซึ่งประกอบด้วยข้อมูลพื้นฐานการนอนหลับปกติและการอยู่เวร คุณภาพการนอนหลับ Pittsburg Sleep Quality Index (PSQI), สุขอนามัยการนอนหลับ Sleep Hygiene Index (SHI), ความอ่อนล้า Stanford Sleepiness Scale (SSS) และระยะเวลาที่อยู่เวร

ผลการศึกษา ส่งแบบสอบถามทั้งหมด 429 ราย มีผู้เข้าร่วมวิจัย 223 ราย คิดเป็น return rate ร้อยละ 51.98 จำนวนชั่วโมงโดยเฉลี่ยของการนอนหลับในวันที่ไม่ได้อยู่เวร 6.62 ชั่วโมง ระยะเวลาที่ใช้ในการนอนหลับเฉลี่ย 15.80 นาที จำนวนเวรเฉลี่ย 9.46 เวรต่อเดือน จำนวนครั้งที่โดนปลุก 3.67 ครั้งต่อเวร จำนวนชั่วโมงที่แท้จริงของการนอนเฉลี่ย 4.12 ชั่วโมงต่อเวร คะแนนเฉลี่ยของ PSQI, SHI, SSS ระหว่างที่ไม่อยู่เวร และ SSS ที่อยู่เวร 5.06±2.66, 30.96±8.27, 2.12±1.29, and 3.71±1.74 ตามลำดับ ความสัมพันธ์ของคุณภาพการนอนหลับ, สุขอนามัยการนอนหลับ มีผลต่อความเหนื่อยล้าจากการทำงานทั้งก่อนและหลังอยู่เวรอย่างมีนัยสำคัญทางสถิติ (p<0.05) โดยพบว่าการเพิ่มขึ้นของ PSQI ทุกๆ 1 คะแนน ส่งผลให้ SSS เพิ่มขึ้น 0.25 คะแนน (95%CI .13-0.31; p<0.01) และการเพิ่มขึ้นของ SHI ทุกๆ 1 คะแนน ส่งผลให้ SSS เพิ่มขึ้น 0.1 คะแนน (95%CI .02-0.8; p<0.01) จำนวนชั่วโมงเฉลี่ยในการนอนหลับในวันที่ไม่ได้อยู่เวร จำนวนเวรต่อเดือน และจำนวนชั่วโมงต่อเวรไม่มีความสัมพันธ์กับคุณภาพการนอนหลับ สุขอนามัยการนอนหลับและความเหนื่อยล้าจากการทำงานหลังอยู่เวร แต่พบว่าจำนวนครั้งที่โดนปลุก และจำนวนชั่วโมงที่แท้จริงที่นอนเฉลี่ยมีความสัมพันธ์กับคุณภาพการนอนหลับ สุขอนามัยการนอนหลับ และความเหนื่อยล้าจากการทำงานหลังอยู่เวรอย่างมีนัยสำคัญทางสถิติ (p<0.05)

สรุป คุณภาพการนอนหลับ, สุขอนามัยการนอนหลับมีความสัมพันธ์ผลต่อความเหนื่อยล้าจากการทำงานทั้งก่อนและหลังอยู่เวรอย่างมีนัยสำคัญ แพทย์ที่มีสุขอนามัยและคุณภาพการนอนหลับที่ดีช่วยลดความเหนื่อยล้าจากการทำงานได้ **เชียงใหม่เวชสาร 2562;58(1):31-41.**

คำสำคัญ: คุณภาพการนอนหลับ สุขอนามัยการนอนหลับ ความเหนื่อยล้า แพทย์ประจำบ้าน