

# ปัจจัยที่สัมพันธ์กับความง่วงในที่ทำงาน คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

กิตติพงษ์ กงสมบูรณ์

ภาควิชาเวชศาสตร์ป้องกันและสังคม คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

## The Associated Factors of Excessive Daytime Sleepiness in the Workplace: Faculty of Medicine, Srinakharinwirot University, Thailand

Kittipong Kongsomboon

Department of Preventive and Social medicine, Faculty of Medicine, Srinakharinwirot University

**หลักการและวัตถุประสงค์:** ความง่วงเกินปกตินำมาซึ่งประสิทธิภาพการทำงานที่ลดลง อุบัติเหตุในที่ทำงานเพิ่มขึ้น เพิ่มปัญหากับเพื่อนร่วมงาน และคุณภาพชีวิตในที่ทำงานลดลง ปัจจัยที่สัมพันธ์กับความง่วงในที่ทำงานได้แก่ เพศ อายุ สถานะสมรส โรคประจำตัว ดัชนีมวลกาย ระยะเวลาในการทำงาน ระยะเวลาในการนอน ภาวะซึมเศร้า ลักษณะของงาน และระดับความเครียด วัตถุประสงค์เพื่อหาความสัมพันธ์ของปัจจัยเสี่ยงกับความง่วงเกินปกติในที่ทำงาน คณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ

**วิธีการศึกษา:** สุ่มเลือกบุคลากรคณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒจำนวน 740 คนจากจำนวนทั้งสิ้น 1,133 คน เป็นการศึกษาเชิงวิเคราะห์ แบบภาคตัดขวาง เก็บข้อมูลในช่วงเดือนพฤษภาคม ถึงเดือนกรกฎาคม พ.ศ. 2552 โดยใช้แบบคัดกรองภาวะซึมเศร้าของกรมสุขภาพจิต (Health-Related Self-Reported Scale) แบบวัดความเครียดของโรงพยาบาลสวนปรุง และแบบวัดความง่วง (Epworth sleepiness scale) หาความสัมพันธ์ระหว่างข้อมูลด้วย Bivariate analysis แล้ววิเคราะห์สหสัมพันธ์ด้วย Logistic regression ทดสอบสมมติฐานแบบสองทางด้วยค่า  $p < 0.05$

**ผลการศึกษา:** พบว่าความชุกของความง่วงเกินปกติร้อยละ 36.7 บุคลากรที่ยังโสดมีความง่วงมากกว่าบุคลากรที่สมรสแล้ว

**Background and Objective:** The excessive daytime sleepiness (EDS) led to decrease work productivity, increase accident in workplace, increase inter-personal problem, and may reduce the quality of work life. EDS associated with gender, age group, marital status, underlying disease, BMI, work duration, sleep duration, depression, job pattern, and stress. The objective was to determine the association of these risk factors with personnel's EDS in the workplace, Faculty of Medicine, Srinakharinwirot University.

**Methods:** The personnel from faculty of Medicine, Srinakharinwirot University were sampled. The sample size was 740 from a total of 1,133. The design was cross-sectional study. The questionnaires composed of general demographic data, the Thai diagnostic screening test of Ministry of Public Health for depression, Suanprung Hospital stress test, and Epworth sleepiness scale. The time duration of study was May - July 2009. The author identified significant explanatory variables through bivariate analysis and then logistic regressions. A two-tailed p-value of less than 0.05 was considered significant.

**Results:** The prevalence of EDS was 36.7%. Single personnel had EDS 2.56 times more than married

Correspondence to: Kittipong Kongsomboon, Department of Preventive and Social Medicine, Faculty of Medicine, Srinakharinwirot University 62 Moo 7 Rangsit-Nakhonnayok Road, Ongkharak, Nakhonnayok 26120, Thailand. Mobile Phone: 081-889-1651 E-mail: kittipoo@swu.ac.th, kongsomboon@gmail.com

2.56 เท่า บุคลากรที่มีภาวะน้ำหนักตัวเกินปกติมีความง่วงมากกว่าบุคลากรที่น้ำหนักตัวน้อยกว่าหรือน้ำหนักตัวปกติ 1.96 เท่า และบุคลากรที่มีความเครียดระดับสูงถึงรุนแรงมีความง่วงมากกว่าบุคลากรที่มีความเครียดระดับต่ำถึงปานกลาง 6.45 เท่า

**สรุป:** ความง่วงเกินปกติในบุคลากรคณะแพทยศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒมีความชุกสูงและพบว่าสัมพันธ์กับภาวะน้ำหนักตัวเกินปกติ ความเครียดระดับสูงถึงรุนแรง และสถานะโสด ผู้บริหารควรให้ความสนใจกับบุคลากรกลุ่มเสี่ยงเหล่านี้

**คำสำคัญ:** ความง่วงเกินปกติ, สถานที่ทำงาน

personnel, overweight personnel had EDS 1.96 times more than underweight to normal weight, and personnel with high to severe stress had EDS 6.45 times more than personnel with mild to moderate stress.

**Conclusion:** The prevalence of EDS in Faculty of Medicine, Srinakharinwirot University was high and associated with overweight, high to severe stress, and single status. The administrators should focus on these high risk groups.

**Keywords:** excessive daytime sleepiness, workplace

ศรีนครินทร์เวชสาร 2553; 25(3): 172-8 • Srinagarind Med J 2010; 25(3): 172-8

## Introduction

The prevalence of excessive daytime sleepiness (EDS) in Malaysia is 14.8%<sup>1</sup> and in Latin America is 16.4%<sup>2</sup> but it has not been studied in Thailand. In primary care population, the patients with sleep disturbance have poor physical and mental health such as pain, mental illness, limited activity, and hypertension<sup>3</sup>. EDS relates to decreasing work productivity and causes accidents in the workplace<sup>4</sup>. It may cause an inter-personal problem with co-workers or their employers. In addition, EDS relates to obstructive sleep apnea syndrome and reduces the quality of work life<sup>5</sup>.

Old age and male with increasing snore relates to EDS<sup>6</sup>. Japanese female workers have EDS more than male. The other risk factors for both male and female Japanese workers are nocturnal sleep deprivation, an irregular sleep-wake schedule, and depression. But married workers, only men has decreasing in EDS. Ban on overtime work and a provision of mental health hygiene reduce EDS at Japanese worksites<sup>7</sup>. The personnel's psychological stress relates to impair sleep such as shortened sleep or fragmentation of sleep<sup>8</sup>. Personnel's stress may come from high job demand, job insecurity, job unfairness, and hazardous condition in the workplace<sup>9,10</sup>. The overweight also relates to obstructive sleep apnea and may lead to EDS<sup>6,11</sup>. The job patterns which are the night shift work such as nurses and the inconvenient work position such as laboratory workers are the risks of EDS<sup>12,13</sup>. The previous study discussed about the appropriate age for shift work in order to decrease health risk and

security in the workplace especially in the older personnel. They have increasing cardiovascular risk and a fatigue syndrome which are not fit for work<sup>14</sup>.

The objective of the present study is to determine the association of the risk factors of personnel's EDS in the workplace, Faculty of Medicine, Srinakharinwirot University such as professional groups, gender, age groups, marital status, underlying disease, BMI, work duration, sleep duration, depression, job pattern, and stress level.

## Materials and Methods

All of the personnel from faculty of Medicine, Srinakharinwirot University were sampled for evaluation. The study design was cross-sectional study. The total personnel were 1,133 but the sample size in the study was 740 or 65%. This project was allowed by Ethical committee of Faculty of Medicine, Srinakharinwirot University.

The questionnaires were composed of four parts. The first part inquired general demographic data. The second part was composed of the Thai diagnostic screening test for depression: Health-Related Self-Reported (HRSR) Scale. The third part was composed of Suanprung Hospital stress test. The fourth part was composed of Epworth sleepiness scale. The data were collected during May to July, 2009.

## General definition

Job pattern divided to two categories, one was the job that was a shift work such as doctor, pharmacist, nurse, and

etc. And the other was the job that was no shift work (regular work) such as dentist, accountant, nutritionist, and etc.

Work time represented the time that personnel worked in the workplace per day. The author categorized to two categories: one was time duration within 8 hours and the other one was time duration beyond 8 hours<sup>18</sup>.

Underlying disease divided in three categories, one was no underlying diseases (85.9%), two was allergic disease (10%), and three was other diseases such as hypertension (0.8%), diabetes mellitus (0.3%), migraine (1.1%), and etc (1.9%).

### Operative definition

The diagnostic screening test for depression in Thai population was Health-Related Self-Reported (HRSR) Scale from the Department of Mental Health, Ministry of Public Health, Thailand interpreted depressive score as:

- Depressive score of 25 or more and less than 30 defined as stress situation, depressive mood, or other psychological problems which should get early treatment.
- Depressive score of 30 or more defined as major depression.

The author defined depression as depressive score was 25 and more including stress situation, depressive mood, or other psychological problems and major depression.

The diagnostic screening test for depression was Suanprung stress test from Suanprung Hospital in Thailand interpreted stress score as:

- Stress score of 0 to 23 defined as mild stress.
- Stress score of 24 to 41 defined as moderate stress.
- Stress score of 42 to 61 defined as high stress.
- Stress score of 62 or more defined as severe stress.

The author defined stress score in two categories. One was mild to moderate stress and the other one was high to severe stress.

The Epworth sleepiness scale (ESS) was a questionnaire intended to measure EDS which defined as ESS was 10 or more. This can be helpful in diagnosing sleep disorders. It was introduced in 1991 by Dr. Murray Johns of Epworth Hospital in Melbourne, Australia<sup>15</sup>.

Sleep deprivation defined as night time sleep less than 7 hours recommend by The National Sleep Foundation of the United States<sup>16</sup>.

The body mass index (BMI) = Body weight in kilograms / Height in meters<sup>2</sup>

It classified by Ministry of Public Health, Thailand as:

- BMI < 18.5 defined as underweight
- BMI  $\geq$  18.5 and  $\leq$  22.9 defined as normal
- BMI  $\geq$  23 and  $\leq$  24.9 defined as risk to overweight
- BMI  $\geq$  25 and  $\leq$  29.9 defined as obesity type 1
- BMI  $\geq$  30 defined as obesity type 2

The author defined overweight as BMI equal to 23 and more, including the risk to overweight, obesity type 1 and obesity type 2<sup>17</sup>.

### Statistical analysis

Categorical variables were analyzed using the Chi-square test. The author first identified significant explanatory variables through bivariate analysis between EDS and other variables such as professional groups, gender, age groups, marital status, underlying disease, BMI, work time, sleep duration, depression, job pattern, and stress level then used logistic regressions, respectively. A two-tailed p-value of less than 0.05 was considered significant.

## Results

Personnel who had EDS were single, they had high to severe stress, and had depression. The other factors as professional group, gender, age group, underlying disease, work time, sleep duration, job pattern, and overweight were not relate to EDS. (Table 1)

Single personnel had EDS 2.56 times more than married personnel, overweight personnel had EDS 1.96 times more than underweight to normal weight, and personnel with high to severe stress had EDS 6.45 times to personnel with mild to moderate stress. Gender, age group, depression, job pattern, and work time did not affect to EDS. (Table 2)

Single personnel worked more than 8 hours more than married personnel 2.36 times and single personnel slept less than 7 hours more than married personnel 1.85 times but marital status did not relate to job pattern. (Table 3)

**Table 1** Personnel's characteristics analyzed between EDS and other factors: professional group, gender, age group, marital status, underlying disease, work time, sleep duration, job pattern, stress level, BMI and depression.

Factors	Daytime Sleepiness (%)		p-value	
	No	Yes		
Professional group:	Doctor	27 (65.9)	14 (34.1)	0.648
	Nurse	137 (63.7)	78 (36.3)	
	Scientist	35 (54.7)	29 (45.3)	
	Officer	220 (64.3)	122 (35.7)	
	Worker	33 (66)	17 (34)	
Gender:	Male	88 (67.2)	43 (32.8)	0.314
	Female	375 (62.5)	225 (37.5)	
Age group:	20 - 29 years	250 (61.1)	159 (38.9)	0.178
	30 - 39 years	162 (66.4)	82 (33.6)	
	40 - 49 years	37 (63.8)	21 (36.2)	
	50 - 59 years	9 (90)	1 (10)	
Marital status:	Single	165 (53)	146 (47)	<0.001*
	Married	191 (70.7)	79 (29.3)	
	Divorce	3 (60)	2 (40)	
	Widow	1 (100)	0 (0)	
Underlying disease:	No	346 (64.1)	194 (35.9)	0.555
	Allergic disease	41 (65.1)	22 (34.9)	
	Other diseases	14 (53.8)	12 (46.2)	
Work time:	Within 8 hours	349 (64)	196 (36)	0.567
	More than 8 hours	81 (61.4)	51 (38.6)	
Sleep duration:	Less than 7 hours	323 (62.7)	192 (37.3)	0.754
	7 hours and more	66 (61.1)	42 (38.9)	
Job pattern:	No shift work	186 (61.2)	118 (38.8)	0.348
	Shift work	263 (64.6)	144 (35.4)	
Stress level:	Mild to moderate	204 (83.6)	40 (16.4)	<0.001*
	High to severe	264 (53.2)	232 (46.8)	
BMI:	Underweight to normal	366 (63.8)	208 (36.2)	0.585
	Overweight	102 (61.5)	64 (38.6)	
Depression:	No	399 (66.3)	203 (33.7)	<0.001*
	Yes	69 (50)	69 (50)	

\*p &lt; 0.05

**Table 2** Odds ratio (OR) of factors affected to EDS by logistic regression: gender, age group, marital status, underlying disease, job pattern, stress level, BMI, work time, and depression.

	Factors	OR	p-value	95%Confidence interval
Gender	Male	1		Reference group
	Female	1.77	0.057	0.98 - 3.20
Age group	20 - 29 years	1		Reference group
	30 - 39 years	1.59	0.067	0.97 - 2.60
Marital status:	Single	1		Reference group
	Married	0.39	<0.001*	0.24 - 0.63
BMI:	Underweight to normal	1		Reference group
	Overweight	1.96	0.023*	1.10 - 3.50
Stress level:	Mild to moderate	1		Reference group
	High to severe	6.45	<0.001*	3.63 - 11.48
Depression:	No	1		Reference group
	Yes	1.43	0.215	0.81 - 2.50
Job pattern:	No shift work	1		Reference group
	Shift work	0.67	0.081	0.43 - 1.05
Work time:	Within 8 hours	1		Reference group
	More than 8 hours	1.51	0.152	0.86 - 2.67

\*p &lt; 0.05

**Table 3** Personnel's marital status and related factors: work time, sleep duration, and job pattern.

	Factors	Marital Status (%)		Prevalence rate ratio	95%Confidence Interval
		Single	Married		
Work time:	Within 8 hours	206 (70.1)	227 (87.3)	2.36	1.64 - 3.39
	More than 8 hours	88 (29.9)	33 (12.7)		
Sleep duration:	Less than 7 hours	64 (23.7)	30 (12.8)	1.85	1.24 - 2.75
	7 hours and more	206 (76.3)	204 (87.2)		
Job pattern:	No shift work	131 (44)	107 (41)	0.95	0.82 - 1.10
	Shift work	167 (56)	154 (59)		

## Discussion

The prevalence of EDS was 36.7 % which was more than prevalence in Malaysia and in Latin America<sup>1,2</sup>. Personnel who had overweight, had EDS more than personnel who had not (Table 2). The pulmonary function of obesity impaired particularly vital capacity or hypoventilation that led to hypercapnia and EDS<sup>19</sup>. Personnel, who had high to severe stress, had EDS more than personnel who had mild to moderate stress (Table 2). Study of Akerstedt demonstrated that stress associated with shortened sleep, fragmentation,

and possibly reduction in sleep stage 3 and 4. On the contrary, shortened or disturbed sleep increased level of stress markers such as cortisol and may exacerbate the effect of stress<sup>8</sup>. The psychosocial work stressors that low influence over decisions and high work demands were associated with insomnia<sup>20</sup>.

Age groups did not significantly relate to EDS (Table 2). Study of Adewole, et al showed that age groups which related to EDS was older age group<sup>6</sup> but the age groups in the present study were mostly (90.5%) 20 - 29 years old and

30 - 39 years old which were younger age groups. The age groups of personnel in this workplace were mostly younger age group so it might find EDS in younger age group more than older age group. Depression associated with EDS by bivariate analysis (Table 1) but when adjusted with other factors by multivariate analysis it did not (Table 2).

The job pattern whether it was shift work or not, did not associate with EDS (Table 2). Personnel had a shift work, they also had a shift time to sleep that it was enough to treat the sleepiness. In addition, the personnel who worked more than 8 hours found about 19.5% of total personnel in the present study and in this group about 5% worked more than 16 hours that they had enough times to sleep at least 7 hours. Study of Bouscoulet, et al. and study of Akerstedt found that EDS associated with multiple factors, it did not only associate with sleep duration but also associated with quality of sleep such as sleep breathing disorder<sup>2</sup>, shortened sleep, and fragmentation of sleep<sup>8</sup>.

The present study demonstrates that EDS did not relate to sleep deprivation but it related to overweight, stress, and marital status. Single personnel had EDS greater than married personnel (Table 2) because the single personnel worked more than 8 hours and slept less than 7 hours so they had more fatigue than married personnel (Table 3).

In conclusion, the prevalence of EDS in Faculty of Medicine, Srinakharinwirot University was high and EDS of personnel associated with overweight, high to severe stress, and single status. The administrators should encourage their personnel to exercise and control nutrition in order to decrease weight. And they could decrease job stress by managing the job insecurity, job demand, job unfairness, and hazardous condition in the workplace<sup>9,10</sup>. In the future, EDS may use other questionnaires in stead of ESS such as Berlin questionnaire which had more details than ESS. The questionnaire may inquire more details about job stress in order to conduct organization strategies.

#### Acknowledgement

The author acknowledges the funding from Faculty of Medicine, Srinakharinwirot University and all personnel in Faculty of Medicine, Srinakharinwirot University for participation.

#### References

1. Kamil MA, Teng CL, Hassan SA. Snoring and breathing pauses during sleep in the Malaysian population. *Respirology* 2007; 12:375-80.
2. Bouscoulet LT, Vázquez-García JC, Muiño A, Marquez M, Lopez MV, de Oca MM, et al. Prevalence of sleep related symptoms in four Latin American cities. *J Clin Sleep Med* 2008 15; 4:579-85.
3. Alattar M, Harrington JJ, Mitchell CM, Sloane P. Sleep problems in primary care: a North Carolina Family Practice Research Network (NC-FP-RN) study. *J Am Board Fam Med* 2007; 20:365-74.
4. Mulgrew AT, Ryan CF, Fleetham JA, Cheema R, Fox N, Koehoorn M, et al. The impact of obstructive sleep apnea and daytime sleepiness on work limitation. *Sleep Med* 2007; 9:42-53.
5. Lopes C, Esteves AM, Bittencourt LR, Tufik S, Mello MT. Relationship between the quality of life and the severity of obstructive sleep apnea syndrome. *Braz J Med Biol Res* 2008; 41:908-13.
6. Adewole OO, Adeyemo H, Ayeni F, Anteyi EA, Ajuwon ZO, Erhabor GE, et al. Prevalence and correlates of snoring among adults in Nigeria. *Afr Health Sci* 2008; 8:108-13.
7. Doi Y, Minowa M. Gender differences in excessive daytime sleepiness among Japanese workers. *Soc Sci Med* 2003; 56:883-94.
8. Akerstedt T. Psychosocial stress and impaired sleep. *Scand J Work Environ Health* 2006; 32:493-501.
9. Elovainio M, Ferrie JE, Gimeno D, De Vogli R, Shipley M, Brunner EJ, et al. Organizational justice and sleeping problems: The Whitehall II study. *Psychosom Med* 2009; 71:334-40.
10. Edimansyah BA, Rusli BN, Naing L, Mohamed Rusli BA, Winn T, Tengku Mohamed Ariff BR. Self-perceived depression, anxiety, stress and their relationships with psychosocial job factors in male automotive assembly workers. *Ind Health* 2008; 46:90-100.
11. Okabayashi K, Kasahara E, Uchiyama H, Yokota K, Togashi Y, Kono C, et al. Obstructive sleep apnea-hypopnea syndrome patients with overweight and hypertension in a Japanese workplace. *J Occup Health* 2007; 49:117-24.

12. Raskeviciene R, Maroziene S. Evaluation of occupational risk factors and laboratory workers' health in biochemical and clinical laboratories of hospitals of Kaunas city. *Medicina (Kaunas)* 2005; 41:512-21.
13. Hirose T. An occupational health physician's report on the improvement in the sleeping conditions of night shift workers. *Ind Health* 2005; 43:58-62.
14. Gander P, Signal L. Who is too old for shift work? Developing better criteria. *Chronobiol Int* 2008; 25:199-213.
15. Johns MW. A new method for measuring daytime sleepiness: the Epworth sleepiness scale. *Sleep* 1991; 14:540-5.
16. Wikipedia. Epworth sleepiness scale. Wikimedia Foundation Inc [online] [cited August 23, 2008]. Available from URL: [http://en.wikipedia.org/wiki/Epworth\\_sleepiness\\_scale](http://en.wikipedia.org/wiki/Epworth_sleepiness_scale).
17. Wikipedia. Sleep. Wikimedia Foundation Inc [on line] [cited September 19, 2009]. Available from URL: <http://en.wikipedia.org/wiki/Sleep>.
18. Thaikruea L, Seetamanotch W, Seetamanotch S. Appropriate cut-off level of BMI for screening in Thai adults. *J Med Assoc Thai* 2006; 89:2123-8.
19. Fido A, Ghali A. Detrimental effects of variable work shifts on quality of sleep, general health and work performance. *Med Princ Pract* 2008; 17:453-7.
20. Akashiba T, Akahoshi T, Kawahara S, Uematsu A, Katsura K, Sakurai S, et al. Clinical characteristics of obesity-hypoventilation syndrome in Japan: a multi-center study. *Intern Med* 2006; 45:1121-5.
21. Jansson M, Linton SJ. Psychosocial work stressors in the development and maintenance of insomnia: a prospective study. *J Occup Health Psychol* 2006; 11:241-8.

