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ORIGINAL ARTICLE

The effects of shift work and other related factors on insomnia symptoms among registered nurses in Thailand

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Abstract

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Insomnia is the most common sleep disorder and can substantially impact quality of life. The nursing profession often involves working in shifts which may lead to increased risk of insomnia symptoms. Understanding the factors associated with insomnia in nurses is important for improving the sleep health and quality of working life of registered nurses in Thailand. The baseline data of the Thai Nurse Cohort Study which included the responses of 18,189 registered nurses collected in 2009 was employed. The authors considered the three insomnia symptoms: Difficulty Initiating Sleep, Difficulty Maintaining Sleep, and Early Morning Awakening. Workplace burden variables and other potentially important factors were also collected. Multiple logistic regression using mixed effect models was applied for the data analysis.

The response rate of this sudy was 58.6%. Most participants were females (96.7%) with mean age of 43.4 years (s.d. = 9.7) and worked predominantly in the day shift (71.3%). Almost one-quarter (24.6%, 95% CI = 23.3 - 25.9) reported experiencing at least one insomnia symptoms. The prevalence of difficulty initiating sleep, difficulty maintaining sleep and early morning awakening were 5.2% (95% CI = 3.7 - 6.7), 8.0% (95% CI = 6.5 - 9.4) and 6.5% (95% CI = 5.0 - 8.0), respectively. Evening and Night shift were associated with a higher risk of both difficulty initiating sleep (Adj. ORevening = 2.11, 95% CI = 1.45 - 3.07; Adj. ORnight = 1.72, 95% CI = 1.01 - 2.94, respectively) and early morning awakening (Adj. ORevening = 1.46, 95% CI = 1.01 - 2.11and Adj. ORnight = 0.41, 95% CI = 0.18 - 0.95, respectively). No workplace burden factors were associated with difficulty maintaining sleep. Perceived mental health and perceived pain were highly associated with all three insomnia symptoms.

The authors demonstrate shift work substantially impacts insomnia symptoms among Thai nurses. Policy-making for nursing personnel recruitment and retention should include the optimization of shift work schedule allocation to promote good sleep health.

Keywords: insomnia symptoms, registered nurses, shift work, workplace burden

วารสารสาธารณสุขและการพัฒนา
ปีที 17 ฉบับที 2 พฤษภาคม-สิงหาคม 2562

ผลของการท◆างานเป็นกะและปัจจัยที่เกี่ยวข้องตออาการนอนไมห ลับในพยาบาลวิชาชีพในประเทศไทย

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บทคัดย่อ

เทอดศักดิ์ น◆าเจริญ กฤษดา แสวงดี สุพรรณี พรหมเทศ วิลัยพร ถิ่นค◆ารพ และ คาเมลอน เฮิร์สต์ ผลของ การท◆างานเป็นกะและปัจจัยที่เกี่ยวข้องต่ออาการนอนไม่หลับในพยาบาลวิชาชีพในประเทศไทย ว. สาธารณสุข และการพัฒนา 2562;17(2):77-91

โรคนอนไม่หลับเป็นความผิดปกติของการนอนที่พบบ่อยที่สุดและสามารถส่งผลกระทบต่อคุณภาพชีวิต วิชาชีพการพยาบาลมักเกี่ยวข้องกับการท◆างานเป็นกะซึ่งอาจน◆าไปสู่ความเสี่ยงต่ออาการนอนไม่หลับ การเข้าใจปัจจัยที่เกี่ยวข้องกับการนอนไม่หลับในพยาบาลจึงเป็นสิ่งส◆าคัญส◆าหรับการพัฒนาสุขลักษณะการนอนหลับและคุณภาพชีวิตการท◆างาน ของพยาบาลวิชาชีพในประเทศไทย การศึกษาครั้งนี้ใช้ข้อมูลพื้นฐานจากโครงการศึกษาคุณภาพชีวิตและการท◆างานของพยาบาลวิชาชีพไทยในระยะยาว จากข้อมูลการตอบแบบสอบถามของพยาบาลวิชาชีพ 18,189 คนที่รวบรวมในปี 2552 ผู้วิจัยพิจารณาอาการนอนไม่หลับสามอย่างได้แก่: อาการนอนหลับยาก, อาการนอนหลับอย่างต่อเนื่องยาก และการตื่นนอนเร็วกว่า ปกติ วเปรที่เกี่ยวข งกับภาระงานและปจ จัยส◆าคัญอื่นๆ การรับ สุขภาพจิต นอกจากนี้ยังวิเคราะหต อ (ซึ่ง รูตอ และการรับรู้ต่อความเจ็บปวด) วิเคราะห์ข้อมูลโดยใช้ Multiple logistic regression using mixed effect model

การศึกษานี้มีอัตราการตอบกลับเท่ากับ 58.6% ผู้ตอบแบบสอบถามส่วนใหญ่เป็นเพศหญิง (96.7%) อายุเฉลี่ย 43.4 ปี (S.D. = 9.7) และส่วนใหญ่ท◆างานในช่วงเวลากลางวัน (71.3%) เกือบหนึ่งในสี่ของผู้ตอบแบบสอบถาม (24.6%; 95% CI = 23.3-25.9) รายงานว่ามีอาการนอนไม่หลับอย่างน้อยหนึ่งอาการ ความชุกของอาการนอนหลับยาก, อาการนอนหลับอย่างต่อเนื่องยาก และการตื่นนอนเร็วกว่าปกติเท่ากับ 5.2% (95% CI= 3.7-6.7), 8.0% (95% CI = 6.5-9.4) และ 6.5% (95% CI = 5.0-8.0) ตามล◆าดับ การท◆างานในเวรบ่ายและเวรดึกมีความสัมพันธ์กับความเสี่ยงต่ออาการนอนหลับยาก (Adj. OR = 2.11, 95% CI = 1.45 - 3.07; Adj. OR = 1.72, 95% CI = 1.01 - 2.94 ตามล◆าดับ) และมีความสัมพันธ์กับความเสี่ยงต่ออาการตื่นนอนเร็วกว่าปกติ (Adj. OR = 1.46, 95% CI = 1.01 - 2.11 และ Adj. OR = 0.41, 95% CI = 0.18 - 0.95 ตามล◆าดับ) ในขณะที่พบว่าปัจจัยที่เกี่ยวข้องกับภาระงานไม่มีความสัมพันธ์กับอาการนอนหลับอย่างต่อเนื่อง

ยาก ย่างมากกับอาการนอนไม่หลับทั้งสามอาการ
และการรับรู้ต่อสุขภาพจิตและการรับรู้ต่อความเจ็บปวดมีความสัมพันธอ
ผลการวิจัยแสดงใหเ้ ห็นวา่ กะมีผลกระทบอยา่ อาการนอนไมห ลับของพยาบาลวิชาชีพในประเทศไทย
การท�างานเป็น งมากต่อ
การก�าหนดนโยบายในการสรรหาและรักษาบุคลากรทางการพยาบาลควรค�านึงถึงการจัดสรรตารางการท�างา
นเป็นกะอยา่ ง มีประสิทธิภาพเพื่อส่งเสริมสุขภาพการนอนหลับที่ดี

ค�าส�าคัญ: อาการนอนไม่หลับ พยาบาลวิชาชีพ การท�างานเป็นกะ ภาระในที่ท�างาน

Introduction

Sleep plays an important role in good health and well-being throughout people lives. Sufficient sleep at the right time has been shown to be protective in terms of physical and mental health, and quality of life. The National Sleep Foundation recommends that the appropriate sleep duration for young adults and adults is 6 to 8 hours, and 7 to 8 hours of sleep is needed for the elderly[1].

Insomnia is the most frequently reported sleep disorder[2]. Estimates of insomnia prevalence in the world range from 15 to 40%[3-4]. Previous studies have identified several factors that may elevate the risk of insomnia including: being female, older age, higher body mass index, smoking, drinking alcohol, poor health status and illness, lack of habitual exercise and shift work[3, 5-6]. At the individual level, insomnia frequently causes physical fatigue or weariness, mental fatigue, and irritability[7]. In addition, insomnia may impair cognitive function and compromise motor skills[8]. Also, empirical evidence indicates that insomnia can lead to the development of diseases and disorders such as hypertension, cardiovascular disease[9], depression[10] and can even lead to increased mortality[11].

Certain professions, by their very nature, are likely to lead to problems with insomnia. Nursing, characterized by long work hours and shift work, is likely to be one of these professions. Studies of insomnia in nurses have revealed that extended work hours are the factor most frequently associated with disturbed sleep quality and sleeping patterns[12-13]. In addition, evidence indicates that night shift and rotating shift nurses are more likely to report poor quality sleep than day shift or evening shift workers[14]. The prevalence of insomnia among nurses is reported to be high (34.3%), particularly in night shift nurses[15]. Poor sleep quality in nurses is likely to lead to poorer occupational safety including increased risk of workplace accidents, accidents with sharpened materials, falls and exposure to biological fluids[16].

Insomnia is an important health problem that may lead to negative impact on nurses in a variety of ways ranging from the health of individual nurses to quality of nursing performance. However, to the best of this study's knowledge there are few studies that have examined the epidemiology of insomnia among nurses in East Asian populations. The aim of this study was to estimate the prevalence, and investigate the factors associated with, insomnia symptoms in Thai registered nurses.

Methods

Study design

This study is a cross sectional study utilizing data obtained from the Thai Nurse Cohort Study (TNCS), a 20-year longitudinal cohort study of the health and working life of registered nurses in Thailand. The present study included only the baseline survey collected between 1st August - 30th September 2009. Age stratified sampling with proportion to size (based on province) was employed and the resulting sample contained 18,756 registered nurses.

Sampling method

A total of 142,699 RNs who held nursing licenses and register with the Thailand Nursing and Midwifery Council in 2008 represented the sampling frame for TNCS. A sample of 50,200 RNs were randomly selected from stratified random sampling based on

the proportionality of the 10-year age stratum of nurses population. The questionnaires were sent via mail using sampling techniques. Of these, 18,198 RNs were unable to contact because the address was incorrect. There were 32,002 nurses received the questionnaire. Of these, 18,756 RNs responded to the mail survey with a response rate of 58.6% and agreed to participate as members of the TNCS. All participants were RNsworking in nursing profession in either the private or public health sector. Nurses who did not have complete information for the outcome or study effect, or nurses who no longer worked in the nursing profession, or who had not worked in the previous 6 months (on date of collection) were excluded from the study (Figure 1). Registered nurses were sent mailed-questionnaires and the respondents were enrolled as cohort members. After assessing eligibility, the sample contained 18,189 participants. All participants who returned their questionnaire provided written informed consent, and ethical approval was provided by the ethics committee for human research, KhonKaen university (HE582371).

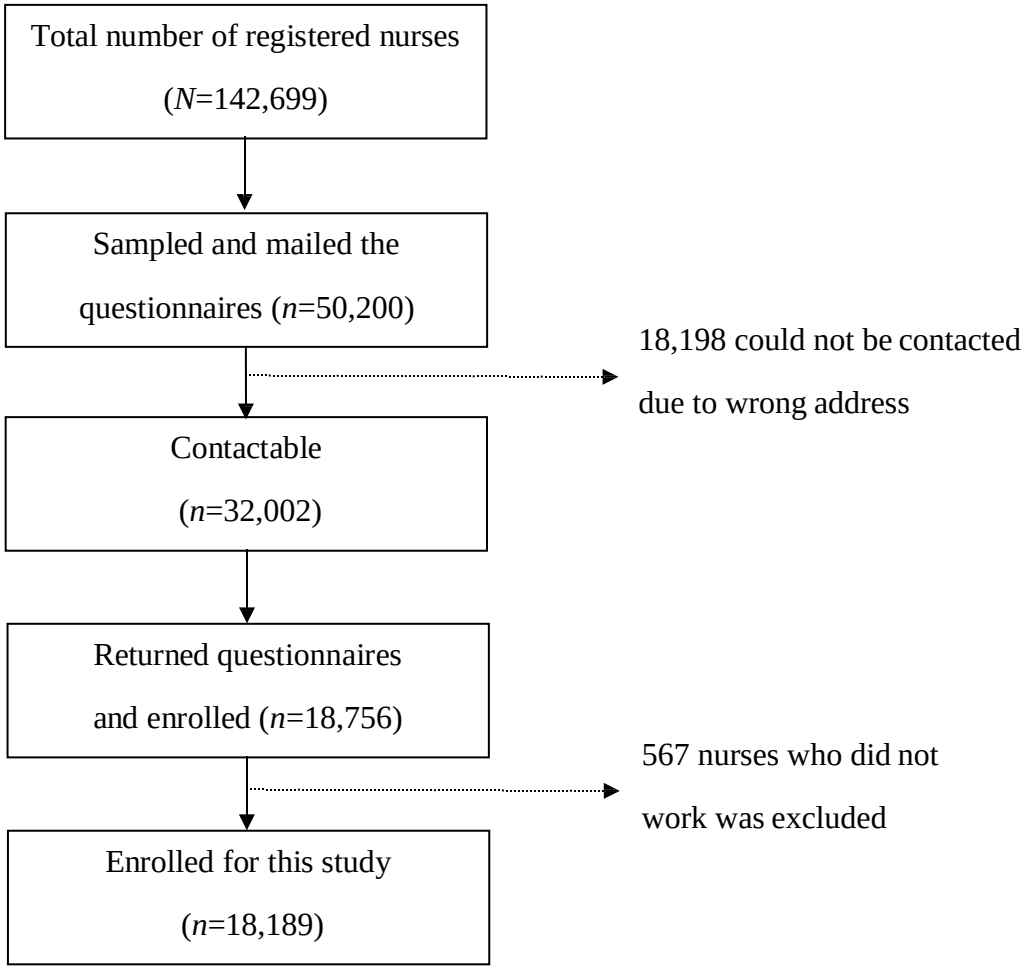

Figure 1 Flow diagram of the study

Study variables

Although the original TNCS survey considers five insomnia symptoms, in the present study the authors focused on only the three symptoms: (1) Difficulty initiating sleep or difficulty falling asleep (DIS); (2) Difficulty maintaining sleep (DMS); and (3) Early morning awakening (EMA). The two additional symptoms measured in the TNCS, excessive daytime sleepiness, and morning awaking feeling unrefreshed, were excluded from the present study because the former is not formally listed as a diagnostic criterion for insomnia (DSM-5) and the second is seldom considered in studies of insomnia symptoms. Symptoms included in present study needed to occur almost every day (more than 3-4 days per week) during the 30 days preceding answering the questionnaire. The authors considered the insomnia outcome in binary form (presence, absence) for each individual symptom.

The factors of interest included type of shift work, substantial night shift duty, worked more than 12 hours per day in the last month and average work hours per week. All were based on the previous 6-month. Other factors contained gender, age, marital status, education level, economic status and family care burden, physical activity, snoring, BMI, chronic medical illness, hospitalization in previous year, whereas perceived anxiety or depression and perceived pain were based on self-reported of symptoms in the previous 30 days of work (none/moderate/severe).

Statistical analysis

Participants characteristics were described using frequencies and percentages for categorical data, and means (standard deviations) or median (range) for continuous variables. For the binary outcomes, DIS, DMSand EMA, the authors employed a multivariable logistic regression model and applied a mixed modeling approach with postcode as a potential clustering effect. All potentially important effects (identified from bivariate analysis, with $p < 0.25$) were subsequently entered into the multivariable models to obtain adjusted estimates. All study effects (workload burden factors) were forced into the multivariable models, regardless of bivariate p-values. All analysis was conducted using the R statistical programming language V 3.2.4 and mixed modeling was performed using the R library lme4. A significance level of 0.05 was used throughout all analysis.

Results

Participants' characteristics

Of these, 18,756 RNs responded to the survey (58.6%), data from 18,189 registered nurses were analyzed. Most participants were women (96.7%), married (60.9%), working in a hospital setting (80.5%) and the average age was 43.4 years with standard deviation (s.d.) of 9.7 as shown in Table 1. Almost three in four, 71.3%, reported working predominantly in the day shift during the last 6 months. Nurses who worked more than 4 night shifts per monthwere relatively prevalent, 54.3%. Nearly half of participants (44.8%) reporting at least some 12 hours work days in the previous 30 days. The average work hours of participants were58.3hours per week (SD = 23.1) (Table 1).

In term of sleep quality, almost one-quarter (24.6%; 95% CI=23.3-25.9) of the participants reported experiencing at least one of the five insomnia symptoms listed in the TNCS survey. The prevalence

Table 1 Distribution of participants by the baseline characteristics

Baseline characteristics	Number	Percent
Gender		
Male	588	3.3
Female	17,153	96.7
AGE (years)		
Mean (*SD*); Median (Min: Max)	43.4 (9.7); 44.4 (18.6: 65.3)	
Marital status		
Single	5,491	30.9
Married	10,831	60.9
Widowed, Divorce, Separate	1,455	8.2
Types of shift work		
Day shift	12,725	71.3
Evening shift	1,018	5.7
Night shift	449	2.5
Rotating shift	3,652	20.5
Worked more than 4 night shifts/month		
No	8,085	45.7
Yes	9,592	54.3
Worked more than 12 hours per day		
No	9,721	55.2
Yes	7,886	44.8
Average work hours per week		
Mean (*SD*); Median (Min: Max)	58.3 (23.1); 54.0 (0: 120)	
Types of work unit		
Hospital	13,749	80.5
Health service center	1,551	9.1
Others (Nursing room, Nursing college/faculty, Department/division)	1,771	10.4
Extra job		
No	13,173	78.8
Yes	3,542	21.2
Income (Baht)		
< 20,000	2,573	14.5
20,001-30,000	5,833	32.9
30,001-40,000	6,174	34.8
40,001-50,000	1,858	10.5
> 50,000	1,312	7.4

Table 1 Distribution of participants by the baseline characteristics (cont.)

Baseline characteristics	Number	Percent
Perception of income sufficiency		
Insufficiency	4,089	23.1
Balance	5,931	33.5
Saving	7,660	43.3
Education levels		
Certificated	4,123	23.7
Bachelor	9,977	57.2
Graduate	3,331	19.1
Family burden		
None	1,734	9.7
Father or mother	3,897	21.8
Child	7,967	44.6
Relative	4,246	23.8
Body mass index (kg/m^2)		
Lower 18.5	1,277	7.2
18.5-22.99	9,374	53.0
23-27.49	5,282	29.9
27.5 or greater	1,743	9.9
Physical activity		
Low	4,281	23.5
Moderate	3,939	21.7
High	9,969	54.8
Snoring		
Barely	11,442	65.9
Sometimes	4,235	24.4
Almost everyday	1,687	9.7
Chronic medical illness (diagnosed)		
No	5,737	33.3
Yes	11,489	66.7
Perceived anxiety/depression		
No	10,622	59.9
Moderate	6,838	38.6
Severe	276	1.6

Table 1 Distribution of participants by the baseline characteristics (cont.)

Baseline characteristics	Number	Percent
Perceived pain		
No	7,908	44.5
Moderate	9,472	53.4
Severe	373	2.1
Hospitalization in previous year		
No	15,680	89.7
Yes	1,807	10.3
Sedative drug		
No	15,604	91.4
Yes	1,477	8.6
Weight loss pill		
No	16,664	97.9
Yes	352	2.1

of at least one of these symptoms was 14.8% (95% CI=13.4-16.1). Specifically, the prevalence of difficulty initiating sleep (DIS), difficulty maintaining sleep (DMS) and early morning awakening (EMA) were 5.2% (95% CI=3.7-6.7), 8.0% (95% CI=6.5-9.4) and 6.5% (95% CI=5.0-8.0), respectively (Table 2).

Association between shift work and other factors depicted by each response variable

Difficulty initiating sleep (DIS)

The multiple logistic regression analysis revealed an association between shift type and the DIS symptom (Table 3). Specifically, evening shift nurses exhibited a higher risk of having DIS, relative to day shift nurses (Adj. OR = 2.11, 95% CI = 1.45-3.07) whereas the authors could not demonstrate any association between working in the night shift greater than 4 days/month, working more than 12 hours per day and average work hours per week with DIS. The authors also found strong association between DIS and other factors, for example, marital status, hospitalization in a previous year and using of sedative drug. Factors regarding extra job, gender, type of work unit, and antidepressant were omitted in Table 2 due to no significant association with three insomnia symptoms.

Difficulty maintaining sleep (DMS)

Table 3, also, demonstrated no association between shifts and DMS insomnia symptom. However, the authors found that nurses whowere married were more likely to have DMS than nurses who are single (Adj. OR = 1.72, 95% CI = 1.35-2.19) and higher income was associated with a lower risk of DMS symptoms (Adj. OR = 0.66, 95% CI = 0.48-0.91). Snoring was also demonstrated to be associated with DMS, with nurses who reported snoring almost every day having 1.83 times the odds of DMS (95% CI = 1.41 - 2.39) relative to nurses who did not report snoring. Also,

Table 2 Prevalence of individual insomnia symptoms

Insomnia symptoms	n of event (n=18,189)	Prevalence (%)	95%CI
Difficulty initiating sleep (DIS)	905	5.2	3.7 - 6.7
Difficulty maintaining sleep (DMS)	1,396	8.0	6.5 - 9.4
Early morning awakening (EMA)	1,137	6.5	5.0 - 8.0
Excessive sleepiness	854	4.9	3.4 - 6.4
Feeling unrefreshed upon waking	2,359	13.4	12.0 - 14.8
At least one of DIS, DMS and EMA	2,577	14.8	13.4 - 16.1
At least one of the five symptoms	4,306	24.6	23.3 - 25.9

Abbreviations: CI, confidence interval

perceived severe anxiety or depression and perceived severe pain were associated with DMS (Adj. OR = 6.09, 95% CI = 3.95 - 9.38, Adj. OR = 2.36, 95% CI = 1.48 - 3.76 respectively).

Early morning awakening (EMA)

Evening shift nurses, in particular, demonstrated nearly 1.5 times the odds (Adj. OR = 1.46, 95% CI=1.01-2.11) of having EMA relative to day shift nurses. In contrast, working in the night shift appeared protective against EMA (Adj. OR = 0.41, 95% CI = 0.18 - 0.95). The authors found no evidence that working in the night shift greater than 4 days/month or working more than 12 hours per day and average work hours per week were associated with EMA. While, severe reported anxiety or depression and having severe pain were strongly associated with EMA (Table 3).

Discussion

Key findings

Insomnia is the most frequently reported sleep disorder in the general population and leads to diverse consequences at both the individual and society level. The nursing profession, by its very nature, is likely to have a high prevalence of insomnia, particularly for night shift nurses. To the best of this knowledge, the current study represents the first study in South East Asia regarding the prevalence of, and factors associated with, individual insomnia symptoms among registered nursesthroughout Thailand.

This present study demonstrated that the prevalence of insomnia among the registered nurses in Thailand was nearly one-quarter (24.6%, 95% CI=23.30-25.90), a level similar to that reported in Japan (24.4%)[17], in Brazil (36.0%)[15] and in Norway (53.9%)[18]. High variability in prevalence estimates across studies may be attributable to differences in definition of

Table 3 Association between type of shift work and individual three insomnia symptoms

	Insomnia symptoms								
	DIS			DMS			EMA		
Factors	COR	Adj.OR	95%CI	COR	Adj.OR	95%CI	COR	Adj.OR	95%CI
Type of shift work, Day shift (ref.)			***						***
Evening shift	2.65***	2.11***	1.45-3.07	1.08	0.88	0.61-1.26	1.30	1.46*	1.01-2.11
Night shift	2.37***	1.72*	1.01-2.94	1.03	0.77	0.45-1.31	0.39*	0.41*	0.18-0.95
Rotating shift	1.62***	1.49**	1.12-1.99	0.92	0.83	0.64-1.06	0.63***	0.77	0.58-1.04
Work more than 4 night shift/month, No (ref.)									
Yes	1.09	0.86	0.69-1.07	1.24**	1.16	0.97-1.39	1.01	0.99	0.82-1.21
Work more than 12 hours/day, No (ref.)									
Yes	1.64***	1.14	0.89-1.46	1.12	0.99	0.82-1.21	1.00	1.10	0.89-1.37
Average work hours per week, In 5 hours	1.03**	1.00	0.98-1.03	1.00	0.99	0.98-1.02	0.99	1.01	0.98-1.03
Age, In 10 years	0.81***	1.13	0.94-1.35	0.99	1.05	0.90-1.22	1.45***	1.55***	1.32-1.81
Marital status, Single (ref.)			***				***		
Married	0.59***	0.63***	0.49-0.80	1.51***	1.72***	1.35-2.19	1.25*		
Widowed, Divorce, Separate	0.69	0.57*	0.36-0.89	1.39	1.24	0.84-1.83	1.68**		
Income (Baht), < 20,000 (ref.)							*		
20,001-30,000	0.66**	0.67*	0.49-0.92	0.89	0.75*	0.57-0.98	1.02	0.70*	0.50-0.98
30,001-40,000	0.60***	0.69	0.47-1.02	0.79	0.66**	0.48-0.91	1.48**	0.77	0.53-1.13
40,001-50,000	0.45***	0.60	0.34-1.05	0.67*	0.64	0.41-1.00	1.52*	0.75	0.47-1.21
> 50,000	0.40***	0.50	0.25-1.01	0.82	0.75	0.45-1.25	1.75**	0.83	0.49-1.42
Perception of income sufficiency, Insufficiency (ref.)			***				***		
Balance	0.80	0.96	0.74-1.25	0.67***	0.80*	0.65-0.99	0.96	1.13	0.88-1.44
Saving	0.58***	0.87	0.66-1.16	0.52***	0.76*	0.61-0.95	0.84	0.92	0.72-1.19
Education level, Certificated (ref.)									
Bachelor	1.18	1.06	0.80-1.39	1.12	1.20	0.97-1.49	0.83	0.97	0.77-1.21

Table 3 Association between type of shift work and individual three insomnia symptoms (cont.)

Factors	Insomnia symptoms								
	DIS			DMS			EMA		
	COR	Adj.OR	95%CI	COR	Adj.OR	95%CI	COR	Adj.OR	95%CI
Graduate	0.76	0.89	0.61-1.29	0.84	0.98	0.73-1.32	0.80	0.80	0.59-1.08
Family burden, None (ref.)						*			
Father or mother	1.14			1.24	1.19	0.82-1.73	0.79		
Child	0.76			1.41*	1.01	0.70-1.45	0.96		
Relative	1.26			1.60**	1.27	0.88-1.82	0.99		
Physical activity, Low (ref.)						**			
Moderate	0.86			0.70**	0.70*	0.54-0.91	0.90	0.83	0.63-1.11
High	0.96			0.95	0.89	0.72-1.10	0.92	0.84	0.66-1.06
Snoring, Barely (ref.)			**			***			***
Sometimes	1.30*	1.32*	1.03-1.69	1.45***	1.29*	1.06-1.59	1.46***	1.21	0.97-1.51
Almost everyday	1.47*	1.37	0.97-1.91	2.23***	1.83***	1.41-2.39	2.33***	1.83***	1.40-2.39
Body mass index (kg/m^2**),** 18.5-22.99 (ref.)									
Lower 18.5	1.56**			1.12	1.20	0.86-1.68	0.93		
23-27.49	1.02			1.27*	1.12	0.91-1.37	1.30*		
27.5 or greater	1.06			1.27	0.87	0.64-1.19	1.30		
Chronic medical illness (diagnosed), No (ref.)									
Yes	1.70***	1.38*	1.05-1.80	1.91***	1.38**	1.11-1.71	1.79***	1.13	0.89-1.44
Perceived anxiety/depress), No (ref.)			***			***			***
Moderate	4.10***	2.51***	1.96-3.21	2.58***	1.85***	1.53-2.23	1.63***	1.50***	1.22-1.84
Severe	14.71***	6.38***	3.81-10.66	10.66***	6.09***	3.95-9.38	3.26***	2.44**	1.38-4.30
Perceived Pain, No (ref.)			***			***			**
Moderate	3.61***	1.87***	1.41-2.47	2.68***	1.76***	1.42-2.17	1.62***	1.31*	1.05-1.62
Severe	9.25***	2.46**	1.40-4.34	6.61***	2.36***	1.48-3.76	3.03***	1.85*	1.07-3.20
Hospitalization in previous year, No (ref.)									
Yes	1.92***	1.45*	1.08-1.94	1.97***	1.62***	1.29-2.04	1.34*		
Sedative drug, No (ref.)									
Yes	10.30***	7.47***	5.91-9.44	3.14***	2.29***	1.80-2.90	2.54***	1.94***	1.48-2.55
Weight loss pill, No (ref.)									
Yes	2.74***			1.78*			2.06**	1.91*	1.13-3.22

Abbreviations: COR, Crude OR; DIS, difficulty initiating sleep; DMS, difficulty maintaining sleep; EMA, early awakening; OR, odds ratio; CI, confidence interval; ref., reference; *** p<0.001; ** p<0.01; * p<0.05

sleep disorders outcomes, work place settings and the population under consideration. However, all previous studies considering insomnia in nurses report unacceptably high prevalence. Interestingly, the prevalence of insomnia among registered nurses in this study was found to be lower than the overall prevalence of insomnia among Thai population, 40.8% in healthy adults and 46.3% in elderly[19]. Furthermore, the prevalence of insomnia is associated with advancing age. This might account for lower estimate of prevalence as the average age of participants in this study was 43.4 (SD=9.7).

The focus of the present study was to gauge the impact of shift work on insomnia symptoms among registered nurses. Interestingly, the authors found that shift work had major impacts on some symptoms, but not on others. Explicitly, evening shift, night shift and the rotating shift work were particularly strongly associated with difficulty initiating sleep (DIS). Despite, some discrepancy in shift work classification and the tools for assessing insomnia symptoms, the results seem to be consistent with those of a study of Israeli nurses which also demonstrated that shift work nurses had a higher risk of DIS than the daytime nurses[20]. Although the finding may indicate strong association between shift work and DIS, the authors could not demonstrate that other work load burden factors such as working the night shift greater than 4-night shift per month, long working hour per day or the average working hour per week to be associated with DIS.

Surprisingly, the authors could not demonstrate any work load factors (shift type, number of night shift >4 shift/month, work longer than 12 hours/day and the average work hour per week) to be associated with difficulty maintaining sleep (DMS). One study has shown that day shift work is associated with mid-sleep awakening[22], but after adjustment for age, BMI, and gender this association disappeared. It is noteworthy that the Admi's study demonstrated that gender (being female) is a stronger predictor for having DMS than shift work type. This is possibly due to emphasizing on nursing professional, the authors could not demonstrate any association between gender and DMS.

For early awakening (EMA) the authors found that working the evening shift was associated with early awakening but somewhat counter intuitively, working the night shift appears to be protective against this insomnia symptom. The reason for this distinction is unclear and may be possibly due to the sleep-wake cycle disturbances, circadian rhythm or due to the fact that evening shift nurses often have to wake up in the early morning and return to the consecutive day shift the following day. In contrast, Admi's study of insomnia in Israeli nurses found early morning awakening was high regardless of shift work[20].

Several studies have found other work load variables to be associated with insomnia symptoms, namely, long work hours can reduce sleep quality[21-22] although these studies were based in broader or other professional populations. This present study found that these other workplace burden factors had little impact on insomnia symptoms in Thai nurses. The results of current contrast with those of a Norwegian study[18] in which, the number of night shifts in the last 12 months could not be shown to be associated with insomnia. Despite there being little empirical evidence of an association between number of night shifts and insomnia symptoms, a high burden of night

shifts and a fast return to day shift is likely to lead to physical fatigue and decreased nursing performance. Furthermore, excessive work has been shown to increase the risk of nursing error and near nursing errors performances including sharps and needle stick injuries[13]. Indeed, Asoka recommended that shift working nurses should take a nap during night work to decrease the risk of insomnia[17].

Strengths and Weaknesses

This present study had some limitations. First, the authors employed a self-administered questionnaire, to collect data which may have led to recall bias, especially for the reporting of insomnia symptoms and perceived mental health (anxiety/depression). Secondly, insomnia symptoms among the Thai nurse population were identified by participants themselves, rather than physician diagnosis. However, it is likely that perceived problems sleeping represent real sleeping difficulties. Finally, this study was cross-sectional so the authors cannot establish causal relationships between shift work and workload burden on insomnia symptoms. Instead the authors are restricted to statements of association.

This study did have some major strengths. Firstly, the data represents a large, nationwide sample of Thai registered nurses, and consequently, the results are likely to generalizable, at the very least, to Thai nurses. Secondly, this is one of the few studies to examine individual insomnia symptoms. The results show that the magnitude, direction and statistical significance of shift work varied across symptoms, thus making it likely that identification of these important associations may have not been elucidated had the authors used a composite measure of insomnia, as used in many other studies.

Recommendations

In line with previous research, the authors found a high prevalence of insomnia symptoms in nurses. The finding in this present study suggests that nurses working the evening shift, the night shift and rotating shift increase their vulnerability to have has difficulty initiating sleep and working in the evening shift is a risk factor for early awakening. Interestingly, the authors could not demonstrate an association between shift work type and difficulty maintaining sleep. The present study also found significant associations between insomnia symptoms and mental health, perceived pain, having chronic illness, hospitalization in the previous year and using sedative drugs.

In conclusion, the predominantly high prevalence of insomnia among registered nurses indicates that nursing personnel have excessive workloads, probably due to the shortages of nurses. Insomnia symptoms in nurses maydecrease the quality of nursing performance, also leading to work related injuries, and subsequently, compromise patient safety. Policy-making concerns for nursing personnel recruitment and retention by hospitals and other organizations should include the optimization of shift work schedule allocation to promote good sleep health.

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