Original Article

Types and Risk Factors for Insomnia among Older Adults in an Outpatient Care Setting

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Objective: Insomnia symptoms [IS] are characterized by difficulty with initiating sleep [DIS], difficulty with maintaining sleep [DMS] and early morning awakening [EMA]. More IS are likely to be associated with poorer sleep outcomes. Studies regarding types of IS and their predictors in the elderly patients are limited. The objectives of this study were to add data on types of IS and risk factors of having more than one IS in Thai older adults.

Materials and Methods: This was a cross-sectional study. Subjects who were aged ≥60 years and who attended the internal medicine outpatient clinic of Srinagarind Hospital, Thailand were randomly interviewed from March 2012 to August 2013. Information on baseline characteristics and sleep variables were collected.

Results: There were 100 participants with insomnia (median age = 71.5; 74% female) recruited from the outpatient medical clinic. Difficulty with maintaining sleep [DMS] was the most frequent IS (70%) and most subjects had at least 2 IS (62%). Being female (adjusted odds ratio [AOR] 5.9), less duration of sleep (AOR 0.6), movement/sound of partner (AOR 10.7) and feeling thirsty (AOR 9.6) were independent factors of having ≥2 IS or more compared to 1 IS.

Conclusion: DMS was the most common. Other than gender, the modifiable factors showed a greater association with having ≥2 IS compared to 1 IS.

Keywords: Age factors, Insomnia, Sleep initiation and maintenance disorders, Outpatient clinic, Tertiary hospital

J Med Assoc Thai 2018; 101 [Suppl. 7]: S183-S189
Website: http://www.jmatonline.com

Insomnia is one of the geriatric syndromes[1,2] that is accompanied by symptoms of daytime impairment such as mood disturbance, fatigue, impairment of attention, concentration and memory, daytime sleepiness, reduced motivation, social dysfunction, tension headache and gastrointestinal symptoms[3]. Insomnia becomes more common with age[3,4] due to age-related changes in sleep architecture, and sleep related-disorders that frequently occur in aging such as Parkinson's disease and Alzheimer's disease[5,6]. The overall prevalence of insomnia among older adults in studies of over 9,000 community-dwelling adults in the US was 42% with an annual incidence of 5%[7,8]. In the Asian Sleep Research Society [ASRS], Thailand, Taiwan and Philippines were 3 Asian countries that had an overall high prevalence of insomnia (52%)[9]. Its prevalence in Thai older adults ranged approximately from 46 to 58%[10,11]. The impact of short sleep time was associated with metabolic disorders including obesity, diabetes and fatty liver. Furthermore, it was related to several behavioral factors[12-14]. The long-term impact of insomnia is related to functional impairment, development of other medical and mental disorders such as cognitive decline, depression and increased health care costs including increased psychotropic medication use. Longitudinal studies showed that daytime napping as a result of sleeplessness during the nighttime is a risk factor for developing cardiovascular disease, falls, and death[6,15,16].

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How to cite this article: Limpawattan P, Euawiriyanukool W, Sawanyawisuth K.Types and Risk Factors for Insomnia Among Older Adults in an Outpatient Care Setting. J Med Assoc Thai 2018;101;Suppl.7: S183-S189.

Insomnia symptoms [IS] are characterized by at least one of the following symptoms: difficulty with initiating sleep [DIS], difficulty with maintaining sleep [DMS] and early morning awakening [EMA][10,17]. DMS is usually the most frequent IS[11]. A study from Thailand showed that at least 1 IS was reported by 70% of older adults but not classified types of IS[10]. While, a study from France found that elderly women had more proportions of 2 or 3 IS than men (47.2% vs. 32.8%)[17]. Another study from Malaysia found that most older adults had mild insomnia (87.8%) with low usage of hypnotic drugs (6.5%)[18]. These data showed an inconsistent of IS among countries. Additionally, predictors of having 2 or more IS in the elderly patients are limited. The present study therefore aimed to add data on types of IS and risk factors of having more than one IS in older adults.

Materials and Methods

Participants

The present study was conducted prospectively at the internal medicine outpatient clinic of Srinagarind Medical School Hospital, Thailand from March 2012 to August 2013. The inclusion criteria were patients who were aged 60 years old or over who attended the outpatient clinic for at least 6 months for their medical illnesses and experienced chronic insomnia symptoms according to the ICD-10 definition[19]. Diagnosis of insomnia was performed by chart review.

The definition of chronic insomnia is a condition of unsatisfactory quantity or quality of sleep, which had persisted for a considerable period of time, including difficulty falling asleep, difficulty staying asleep, or early morning awakening, and insomnia that occurred at least 3 times a week for more than 4 weeks[19].

Measures

A questionnaire used in several tertiary hospitals in Thailand was distributed to the eligible patients to investigate characteristics of insomnia problems over the previous month and factors that might be associated with sleep; light shining in the bedroom, hot weather, cold weather, limb movement, tingling sensation of the feet, snoring, sound or movement of partner, feeling necessity to urinate, feeling thirsty, feeling hungry, heartburn, abdominal bloating, airway attack, coughing, chest pain, nightmares or alcohol use[21]. Additionally, focusing on demographic characteristics such as age, gender, marital status, educational level, average income, source of income, duration of sleep, current medical illnesses, perceived impact on daily activities and psychotropic medication use were collected.

The questionnaire of sleep characteristics and factors interfering with sleep was on a 5-point scale of responses 0 to 4; 4 being the most interfering. The presence of the variables was identified when the answers to any of the questions were 3 and 4 which means “often” and “always”. The 0 to 4 scales were defined as 4 = always happens (76 to 100%), 3 = often happens (51 to 75%), 2 = sometimes happens (26 to 50%), 1 = rarely happens (1 to 25%), 0 = never happens (0%). The percentages referring to the general number of nights in which the symptoms happened over the past 1 month.

Procedure

The potential subjects were asked about their willingness to participate in the present study. When the subjects agreed, the subjects were asked to respond to the questionnaire by themselves. The researchers were 3 persons trained for assisted the patients for the unclear questions; two physicians and one nurse. The baseline characteristics of the subjects were collected. The sleep questionnaire was then used to assess the sleep problem, impact on daily activities and psychotropic medication use. Chart reviews on baseline data such as co-morbid diseases and use of psychotropic medications were performed after patient enrollment.

Sample size

There were two objectives of the present study; prevalence of IS and risk factors of IS. Sample size calculation was based on these two objectives. For the first objective, the estimated prevalence of insomnia among older adults in the outpatient setting of 50% derived from the prevalence in previous studies[7, 9-11]. The estimation of a population proportion with a specified absolute precision formula was used[22]. With 95% confidence, the required sample size was at least 93 participants for this objective. Regarding the secondary objective, it was anticipated that there would be seven factors associated with insomnia symptoms: age, gender, obesity, sleeping medication, nightmares, chronic diseases including depression, loud snoring. The sample size estimation was based on the current recommendation among statisticians for multiple logistic regression analysis, i.e., that the number of subjects with insomnia symptoms being five to ten times the number of risk factors in the multiple logistic

model[23]. Therefore, approximately 70 subjects with insomnia symptoms were needed for the second objective. Therefore, the required sample size was 93 for both objectives.

Statistical analyses

Demographic data variables and sleep variables were divided into dichotomous or polytomous variables. All variables used descriptive statistics, presentations in percentages, means and standard deviations. If the distribution of these data was not a normal distribution, then medians and inter-quartile ranges were used instead. The effects of factors associated with the number of insomnia symptoms were evaluated using univariate and multiple logistic regressions. For univariate analysis, unadjusted odd ratios and 95% confidence intervals [CI] were reported. The factors with $p<0.20$ or factors with previous reports of clinical significance were then entered into a multiple logistic regression model. The $p<0.05$ was considered to indicate statistically significant differences and adjusted odds ratios [OR] and their 95% CI were reported to consider the strength of association between possible factors and numbers of insomnia symptoms. All the data analyses were carried out using STATA version10.0 (StataCorp, College Station, Texas).

Approval from the institutional review board for human research of Khon Kaen University was obtained. Because it was research using interview procedures, the information obtained from the questionnaires was not traceable to any specific patients. Therefore, waived informed consent was authorized.

Results

Participant characteristics

One-hundred patients were approached and all of them accepted to participate the study. Baseline characteristics of the study population categorized by having one IS vs two or more IS are shown in Table 1. The majority of the participants were female (74%) and cardiovascular diseases including hypertension (67%) valvular and other heart disease (13%), diabetes (49%), dyslipidemia (40%) and chronic kidney disease (20%) were common in the sample.

Insomnia symptoms

The presentation of insomnia symptoms [IS] in the studied population including difficulty with initiating sleep [DIS], difficulty with maintaining sleep [DMS], and early morning awakening [EMA] are demonstrated in Figure 1. Fifty percent of the patients reported waking unrefreshed in the morning. DMS only 16%, DIS only 11%, EMA only 9%, DMS with DIS 13%, DMS with EMA 13%, DIS with EMA 10%, DMS with DIS with EMA 28%.

Factors associated with the number of insomnia symptoms over the past month

The risks of reporting one or more IS using the univariate analysis models revealed that 2 IS were more frequent among women, individuals with less education, type of income from both salary/pension and salary support, presence of heart disease and anxiety, shorter duration of sleep, experiences of cold weather, light shining in the bedroom, movement or sound of partner, airway attack, thirst and nightmares. Note that those who had at least 2 IS had significantly higher numbers of interfering factors on sleep than those who had 1 IS (92.4% vs. 67.6%; p-value = 0.03) as shown in Table 1. These factors were entered in multiple logistic regression analyses. Only 4 of these factors were found to be independently related to having at least 2 IS: being female, less duration of sleep, movement or sound of partner and feeling thirsty (Table 2).

Discussion

Characteristics of insomnia symptoms in older adults with chronic medical illnesses

Older adults with insomnia who visited the outpatient clinic for their medical problems had various distributions of IS. Consistent with data from other reports[3,10], insomnia was more common among women and DMS was the majority of all IS (70%). This can be explained by several factors including aging process, chronic medical/psychological disorders, alternation of hormone, circadian rhythmicity, low physical activity, less light exposure and sleep apnea[10,17]. The proportion of DMS in the present study was higher than a previous report in older Thai adults which found DMS approximately a third of all IS (32.4%)[10] whereas the present study was 70%. The difference might be due to the different settings. Previous data were from a community-based setting whereas the present study was done in a tertiary care hospital[10]. Thus, the subjects in the present study were likely to have more severity of medical diseases that contributed to greater sleep disturbances.

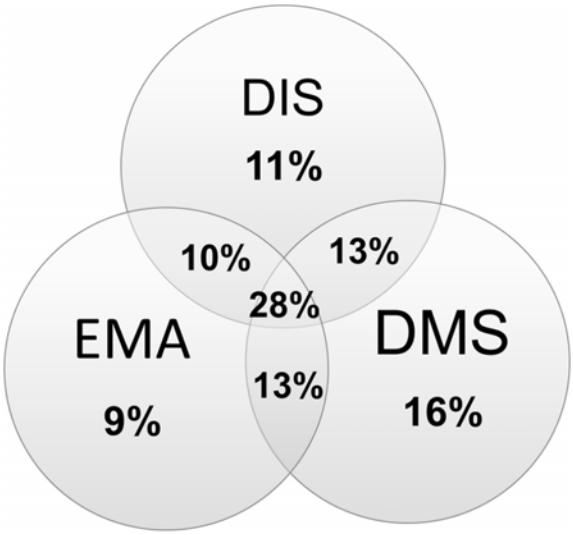
The earlier reports showed that DMS alone was the most frequent IS in males whereas DIS with DMS with EMA was the commonest in females[3,17] while most patients in this study experienced at least 2

Table 1. Factors associated with having at least 2 IS compared to 1 IS by univariate logistic regression analyses

Factors	At least 2 IS n = 66 (66%)	1 IS n = 34 (34%)	*p*-value
Sociodemographic variables			
Age in years (median, IQR1, IQR3)	70 (65, 75)	72 (67, 76)	0.30
Female, n (%)	52 (78.8)	22 (64.7)	0.01
Marital status, n (%)			
Married	39 (59.1)	16 (47.1)	
Widow	27 (40.9)	17 (50)	0.30
Separated	0 (0)	1 (2.9)	-
Education, n (%)			
≤6 years	54 (81.8)	22 (64.7)	
>6 years	12 (18.2)	12 (35.3)	0.06
Income (USD), n (%)			
<315	54 (81.9)	25 (73.5)	-
315 to 630	7 (10.6)	5 (14.7)	0.90
631 to 945	1 (1.5)	4 (11.8)	0.90
946 to 1,260	1 (1.5)	-	0.90
1,261 to 1,575	2 (3.0)	-	-
Not available	1 (1.5)	-	-
Type of incomes, n (%)			
Salary/pension	6 (9.1)	7 (21.2)	
Family support	20 (30.3)	12 (36.4)	0.30
Both	40 (60.6)	14 (42.4)	0.06
Clinical characteristics			
Body mass index (BMI), kg/m^2, n (%)			
<18.5	7 (10.6)	2 (5.9)	
18.5 to 22.9	15 (22.7)	11 (32.4)	0.30
23 to 24.9	12 (18.2)	9 (26.4)	0.30
>25	27 (40.9)	10 (29.4)	0.80
Not available	5 (7.6)	2 (5.9)	-
Illness, n (%)			
Hypertension	46 (69.7)	21 (61.8)	0.40
Diabetes	33 (50)	16 (47.1)	0.80
Dyslipidemia	25 (37.9)	15 (44.1)	0.50
Chronic kidney disease	8 (12.1)	3 (8.8)	0.60
Heart disease	16 (24.2)	4 (11.8)	0.10
Anxiety	0 (0)	2 (5.6)	0.05
Alcohol use, n (%)	2 (3)	0 (0)	-
Psychotropic medication use, n (%)	29 (43.9)	16 (47.1)	0.90
Duration of sleeping in hours/day (median, IQR1, IQR3)	4 (3,5)	5 (3.5,6.5)	0.02
Interfering factors, n (%)			
Hot weather	19 (28.8)	6 (17.7)	0.23
Cold weather	4 (6.1)	0 (0)	0.10
Loud noise	11 (16.7)	3 (8.8)	0.30
Movement or sound of partner	15 (22.7)	2 (5.9)	0.05
Light shining in the bedroom	4 (6.1)	1 (2.9)	0.50
Repetitive cramping or jerking of legs	5 (7.6)	5 (14.7)	0.50
Airway attack	6 (9.1)	0 (0)	0.07
Heart burn	2 (3)	1 (2.9)	1.00
Abdominal discomfort	5 (7.6)	5 (14.7)	0.30
Hungry	3 (4.6)	1 (2.9)	0.70
Feeling thirsty	12 (18.2)	3 (8.8)	0.20
Nocturia	43 (65.2)	18 (52.9)	0.30
Nightmare	6 (9.1)	0 (0)	0.07
Unpleasant feeling or sensation and strong urge to move	19 (28.8)	6 (17.4)	0.23
1 or more interfering factors	61 (92.4)	23 (67.6)	0.03

The $p<0.05$ was statistically significant, IS; insomnia symptoms, OR; odds ratios

IS. Thus, for Thai older adults with chronic medical illnesses, evaluating IS should be focused on all components of IS as those subjects are at risk to have more than 1 IS per month which may be related to diverse causes and differ from person to person. The results from this study are slightly more in favor of emphasizing DMS in medical screening. Not only was DMS the most common IS, it is also not as likely to be salient for medical providers given that DIS is a frequent complaint in adults and EMA is common in older adults due to advanced circadian phases. The combination of several risk factors potentially contribute to insomnia in older adults[8]. Correcting only a single cause may not significantly improve IS in the elderly. Therefore, it is essential for the physician to be aware of those factors that could have consequences on sleep quality.



DIS = difficulty with initiating sleep, DMS = difficulty with maintaining sleep, EMA = early morning awakening

Figure 1. Sleep patterns of older adults with insomnia symptoms.

Factors associated with number of IS

The strongest factors associated with reporting at least 2 IS compared to 1 IS using multiple logistic regression was movement or sound of partner (adjusted OR 10.7), followed by feeling thirsty (adjusted OR 9.6) and being female (adjusted OR 5.9). Less duration of sleep was found more common in subjects with at least 2 IS (adjusted OR 0.6). Therefore, interfering factors which are modifiable causes have more impact on the number of IS than being female and realizing those factors that include evaluating the partner and asking about feeling thirsty could be helpful. Thirst may be the result of an emotional symptoms or physical disease such as hyperglycemia, obstructive sleep

Table 2. Factors associated with having at least 2 IS compared to 1 IS by multiple logistic regression

Factors	Adjusted OR (95% CI)	*p*-value
Demographic variables		
Being female	5.9 (1.3, 26.6)	0.02*
Education		
≤ 6 years	1	-
> 6 years	1.3 (0.3, 5.4)	0.70
Source of income		
Salary/pension	1	
Family support	1.5 (0.2, 9.3)	0.70
Both	2.5 (0.4, 15.6)	0.30
Heart disease	3.5 (0.7, 17.5)	0.10
Anxiety	NA	
Duration of sleep	0.6 (0.5,0.9)	<0.01*
Interfering factors		
Cold weather	NA	
Movement or sound of partner	10.7 (1.5, 76.1)	0.02*
Light shining in the bedroom	2.5 (0.1, 48.9)	0.60
Feeling thirsty	9.6 (1.6, 57.7)	0.01*
Nightmare	NA	

The $p<0.05$ was statistically significant, IS; insomnia symptoms, OR; odds ratios, NA; not applicable due to small numbers of subjects

apnea, or be medication-related and therefore assessing underlying conditions are advised. Similar to prior reports regarding gender variations in the older population, females were more likely than males to report to have at least 2 IS. This can be explained by the differences in physiology, socio-cultural views, behavior or adaptation leading to diverse susceptibility to similar risk factors[17].

Some limitations were observed. Firstly, the present study could not analyze some reported factors influencing insomnia symptoms such as depression. Secondly, recall bias might occur because many variables were self-reported such as quantified total sleep time as the participants did not use sleep diaries. Additionally, information provided by the participants may not be 100% accurate due to the limitation of using the questionnaire. Thirdly, given the high odds ratio and wide confidence intervals, they were likely due to the rather low sample size and possibly inadequate acquisition of interesting factors. Fourthly, as the study setting was at a tertiary care hospital and therefore subjects were likely to have multiple medical illnesses of more severity than in the general hospital or community setting and factors of insomnia were expected to have more complexities. Application of the results might be helpful in similar settings. Lastly, even the numbers of subjects made with the required sample size calculation (93 patients), it was rather small. Further larger studies may be needed.

The strength of the present study; however, was that this was the first study focusing on IS among older adults with multiple medical comorbidities which can be of benefit for physicians to recognize associated factors that may be related to the underlying diseases of the patients.

Conclusion

Difficulty to maintain sleep was the most frequent insomnia symptom among older adults with chronic medical illnesses. Movement or sounds of the partner, feeling thirsty, being of the female sex and less sleep duration were factors associated with having frequent insomnia symptoms.

What is already known to the topic?

Insomnia is prevalent with ages and is associated with unfavorable health outcomes. More IS are likely to be associated with poorer sleep outcomes. At least one insomnia symptoms affected older adults around 70% in previous study of Thailand. There are limited data of characteristics of insomnia symptoms in these populations.

What this study adds?

Difficulty with maintaining sleep is the most common insomnia symptoms among older adults. Most patients experienced at least 2 IS. The factors associated with reporting at least 2 IS compared to 1 IS were movement or sound of partner, feeling thirsty, and being female. Therefore, for Thai older adults with chronic medical illnesses, evaluating IS should be focused on all components of IS and their related factors which may be related to diverse causes and differ from person to person.

Acknowledgements

The authors gratefully to acknowledge Professor James A. Will, University of Wisconsin-Madison, for editing the manuscript via the Faculty of Medicine Publication Clinic, Khon Kaen University, Thailand. This manuscript was supported by the Faculty of Medicine, Khon Kaen University, Thailand, Sleep Apnea Research Group (Khon Kaen University, Thailand) and the Thailand Research Fund (number IRG 5780016).

Potential conflicts of interests

The authors declare no conflict of interest.

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