Development of the Thai Version of the Athens Insomnia Scale (AIS-Thai)

Abstract

Background: Insomnia is a common condition in clinical practice. Athens Insomnia Scale (AIS) is a simple questionnaire for insomnia assessment.

Objectives: The aim of this study was to develop and validate a Thai version of the Athens Insomnia Scale (AIS-Thai) and a modified Athens Insomnia Scale (modified AIS-Thai).

Materials and Methods: The AIS-Thai was created using a back translation design. The modified AIS-Thai was also developed to a more simplified version. Twenty patients (10/20 had insomnia) were enrolled at our outpatient neurology clinic. The participants completed 2 questionnaires for 2 times. Test-retest analysis using intraclass correlation coefficient (ICC) and ROC curve were performed.

Results: The AIS-Thai and modified AIS Thai were developed. The ICC varied from 0.64-0.93 in AIS-Thai and 0.68-1 in the modified AIS-Thai group. Higher scores were found in people with insomnia. The AIS-Thai and modified AIS-Thai had cut-off values for identifying pathological insomnia at 7 and 11, respectively.

Conclusion: The AIS-Thai and modified AIS Thai are reliable and valid for assessing insomnia among Thai population.

Keywords: Athens Insomnia Scale, insomnia, Thai, reliability, validation

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Introduction

It is estimated that insomnia symptoms are prevalent in approximately one-fifth of the general adult population.[1] A random sample of Thai population over 60 years of age found that the prevalence of insomnia in the population was 46.3

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percent.[2] Several studies show that chronic insomnia has a negative impact on daytime function and quality of life, and insomnia with objective short sleep duration is associated with increased cardiovascular risk and mortlity.[3,4]

There are several self-rating scales currently available for evaluating subjective insomnia. Among these, the Pittsburgh Sleep Quality Index (PSQI)[5], the Insomnia Severity Index (ISI)[6], and the Athens Insomnia Scale (AIS)[7] are commonly used, authorized insomnia symptom questionnaires. All three scales have been shown to have appropriate diagnostic utility and include a set of items for evaluating both nocturnal sleep disturbance and daytime dysfunction. In regard to the specific characteristics of each scale, the item for frequency of sleep medication use is set only in the PSQI.

PSQI has somewhat more items than the AIS and ISI (19, 8, and 7 items, respectively) and scoring points for each item is not easy in the PSQI. In the ISI, it is doubtful whether patients' self-rating of insomnia severity ratings for each symptom, between 0 (none) and 4 (very severe), is adequate.

The Athens Insomnia Scale (AIS) is a self-rating inventory consisting of eight items.[8,9] The first five assess difficulty in sleep initiation, awakening during the night, early morning awakening, total sleep duration, and overall quality of sleep. The last three items pertain to the daytime consequences of insomnia (i.e., problems with sense of well-being, overall functioning, and sleepiness during the day). The following two versions of the original AIS were validated: the total version of the scale (AIS-8) and the five-item version for nocturnal sleep problems (AIS-5). Each item of the AIS is rated on a 4-point scale (i.e., 0 = no problem at all, 1 = slightly problematic, 2 = markedly problematic, and 3 = extremely problematic). Respondents are required

to rate their subjective judgment of symptom-positivity (1, 2, and 3) if they have experienced sleep difficulties at least three times per week during the preceding month (consistent with the ICD-10 criteria for insomnia). The total score cut-off for identifying pathological insomnia in the original AIS version has been previously determined as 6 points.

The state of insomnia seems to be easier to clarify by using the AIS than the PSQI and the ISI. While the AIS can be regarded as a highly useful instrument in both clinical and research settings. A well-translated and validated Thai version of AIS has not yet been established. Therefore, this study aimed to develop a Thai version (AIS-Thai). Moreover, a modified version of AIS-Thai (modified AIS-Thai) was also developed in this study, in order to simplify and adjust with our language. Both AIS-Thai and modified AIS-Thai were validated in this study.

Material and Methods

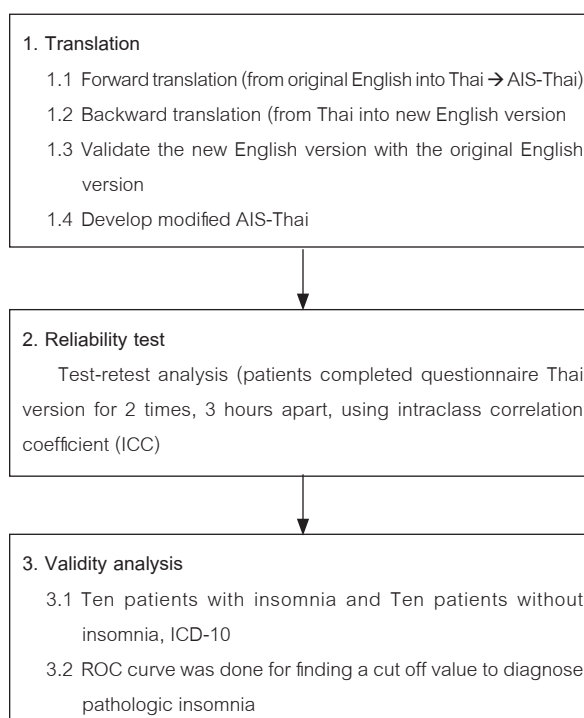Our study included 3 processes, as Figure 1.

1. Translation
   1.1 Forward translation (from original English into Thai → AIS-Thai)
   1.2 Backward translation (from Thai into new English version
   1.3 Validate the new English version with the original English version
   1.4 Develop modified AIS-Thai

2. Reliability test
   Test-retest analysis (patients completed questionnaire Thai version for 2 times, 3 hours apart, using intraclass correlation coefficient (ICC)

3. Validity analysis
   3.1 Ten patients with insomnia and Ten patients without insomnia, ICD-10
   3.2 ROC curve was done for finding a cut off value to diagnose pathologic insomnia

Figure 1

1. Translation

This consisted of first translating the scale from English into Thai (the forward translation) and then from Thai back into English (the backward translation), both processes were done by 4 independent bilingual persons who had never known the Athens Insomnia Scale (AIS). Finally evaluating the level of agreement between the two English versions (original and back-translated) were compared, each word, phrase or sentence. High agreement in each portion (more than 80%) represented good Thai translation. However, if some portions of the translated questionnaire showed disagreement, the authors further adjust them. We also developed a Modified AIS-Thai by simplifying some parts of the AIS-Thai in order to keep them short and easy to understand.

2. Reliability test (During June 2020 to November 2020)

Both AIS-T and modified AIS-T were further assessed for test-retest reliability analysis. Twenty participants were enrolled at the out-patient clinic, Division of Neurology, Phramongkutklao Hospital. Each individual volunteer completed both questionnaires (AIS-Thai and modified AIS-Thai) for 2 times, 3 hours apart. To compare the first and second answers of the same volunteer, intraclass correlation coefficient (ICC) was used. The ICC of more than 0.6 indicated acceptability for the translated version.

3. Validity analysis

Among 20 participants, ten were diagnosed with insomnia ICD-10[10]). In this process, A receiver-operator curve (ROC curve) was used to identify a cut off value to diagnose insomnia.

Ethical consideration and statistical analysis

This study was conducted after receiving the approval of the Institutional Review Board Royal Thai Army Medical Department (R025q/63). Demographic data showed as mean, standard deviation, number and percent. Intraclass correlation coefficients (ICC) was used for reliability analyses. A receiver-operator curve (ROC) was plotted and the mean (95% confidence interval [CI]) area under the curve (AUC) was used to estimate an AIS-Thai cut-off score for distinguishing pathological insomnia from a normal condition. All statistical analyses were conducted using SPSS version 27.0 for Windows.

Results

After forward and backward translation, the Athens Insomnia Scale Thai version (AIS-Thai) and modified AIS-Thai were developed, as shown in appendix 1 and 2, respectively.

From test-retest analysis, it was found that intraclass correlation coefficient values (ICC) of each question varied from 0.64-0.93 in AIS-Thai and 0.68-1.00 in Modified AIS-Thai questionnaires, respectively. The ICC for modified AIS-Thai in each question was higher than the ICC for AIS-Thai. The details of ICC in both Thai sleep questionnaires were shown in Table 1.

To identify the cut-off score for the AIS-Thai and the Modified AIS-Thai for distinguishing pathological insomnia from a normal condition, the ROC curves were done. The cut-off value of the AIS-Thai for insomnia was estimated at 7 points, with a sensitivity of 78% and a specificity of 100%, the area under the curve (AUC) of 0.96 (95% CI 0.082-1.000), Table 2. The cut-off value of the modified AIS-Thai for insomnia was estimated at 10.5 points (or 11 for practical use), with a sensitivity of 78% and a specificity of 100%, the AUC 0.929 (95% CI 0.818-1.000), Table 2.

Table 1 Intraclass correlation coefficients (ICC) for test, re-test analysis

Item	AIS-Thai		Modified AIS-Thai	
	ICC	*p*-value	ICC	*p*-value
1: Sleep induction	0.850	<0.001	1.000	
2: Awakenings during the night	0.683	<0.001	0.807	<0.001
3: Final awakening earlier than desired	0.657	0.001	0.881	<0.001
4: Total sleep duration	0.836	<0.001	0.758	<0.001
5: Overall quality of sleep	0.645	0.001	0.841	<0.001
6: Sense of well-being during the day	0.823	<0.001	0.688	<0.001
7: Functioning (physical and mental) during the day	0.879	<0.001	0.784	<0.001
8: Sleepiness during the day	0.76	<0.001	0.936	<0.001
Total score	0.931	<0.001	0.949	<0.001

AIS: Athens insomnia scale

Table 2 Cut-off point for diagnosing insomnia

	AUC (95%CI)	Cut-off score	Sensitivity	Specificity
AIS-Thai	0.960	4.5	1.000	0.818
	(0.882-1.000)	5.5	0.778	0.818
		7.0	0.778	1.000
Modified AIS-Thai	0.929	6.5	1.000	0.636
	(0.818-1.000)	7.5	0.778	0.727
		8.5	0.778	0.909
		10.5	0.778	1.000

AIS: Athens insomnia scale

Discussion

Insomnia tended to be under diagnosed even by healthcare providers. Developing a reliable and simple questionnaire in own local language would be helpful. Our study demonstrated a high reliable and valid insomnia questionnaire in Thai language for assessing insomnia among Thai population. The cut off score in diagnosing insomnia by AIS-Thai (7 and Modified AIS-Thai score was 11) were higher than the cut-off score of the original AIS (6 score).[10] Modified AIS-Thai seems a user-friendly instrument suitable for use in Thai people at any educational level.

There were some limitations of this study. First, the sample size for validity analysis was small. Second, this insomnia battery included few assessment items, contrast to the Pittsburgh Sleep Quality Index and the Insomnia Severity Index. Nonetheless, this study showed that the AIS-Thai and modified AIS-Thai provided high validity, convenient to administer and high accuracy. Therefore, the AIS-Thai and modified AIS-Thai would be expected to have high utility, not only in epidemiological research but also in clinical practice.

Future studies for accuracy analysis in using these Thai insomnia versions would be necessary. Furthermore, using the AIS-Thai and the Modified AIS Thai to assess the severity and prevalence of insomnia in specific populations as well as to identify treatment effects would be useful.

Conclusion

This study demonstrates that the Athens insomnia scale-Thai and Modified Athens insomnia scale-Thai have high reliability with different cut off value.

Acknowledgements

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Appendix 1. Athens insomnia scale-Thai

HN_____   ☐ชาย☐หญิง   อายุ___ปี   ครั้งที่☐ 1   ☐2

แบบสอบถามภาวะนอนไม่หลับฉบับภาษาไทย

Athens Insomnia Scale: Thai version

แบบสอบถามฉบับนี้มีวัตถุประสงค์เพื่อให้ท่านประเมินตนเองเกี่ยวกับปัญหาการนอนไม่หลับของท่าน กรุณาทำเครื่องหมาย
(โดยการวงกลมตัวเลข) ใต้รายการด้านล่างนี้เพื่อระบุระดับของปัญหาการนอนไม่หลับ ซึ่งเกิดขึ้นอย่างน้อยสามครั้งต่อ
สัปดาห์ในช่วงเดือนที่ผ่านมา

1. <u>การเข้านอน (เวลาตั้งแต่ปิดไฟจนท่านหลับ)</u>

0	1	2	3
ไม่มีปัญหา	ช้าเล็กน้อย	ช้ามาก	ช้ามากที่สุดหรือไม่หลับเลย

2. <u>ตื่นในช่วงกลางคืน</u>

0	1	2	3
ไม่มีปัญหา	มีปัญหาเล็กน้อย	มีปัญหามาก	มีปัญหามากที่สุดหรือไม่หลับเลย

3. <u>ตื่นนอนเร็วกว่าที่ท่านต้องการ</u>

0	1	2	3
ไม่เร็วเกินไป	เร็วกว่าที่คาดไว้เล็กน้อย	เร็วกว่าที่คาดไว้มาก	เร็วกว่าที่คาดไว้มากที่สุดหรือไม่หลับเลย

4. <u>ระยะเวลาในการนอนทั้งหมด</u>

0	1	2	3
เพียงพอ	ไม่เพียงพอเล็กน้อย	ไม่เพียงพออย่างมาก	ไม่เพียงพออย่างมากที่สุดหรือไม่หลับเลย

5. <u>คุณภาพการนอนโดยรวม (ไม่ว่าจะนอนนานเท่าไหร่ก็ตาม)</u>

0	1	2	3
น่าพึงพอใจ	ไม่พึงพอใจ	ไม่น่าพึงพอใจอย่างมาก	ไม่น่าพึงพอใจอย่างมากที่สุดหรือไม่หลับเลย

6. <u>รู้สึกอยู่ดีมีสุขระหว่างวัน</u>

0	1	2	3
ปกติ	ลดลงเล็กน้อย	ลดลงอย่างมาก	ลดลงอย่างมากที่สุด

7. <u>ประสิทธิภาพการทำงาน (ของร่างกายและจิตใจ) ในระหว่างวัน</u>

0	1	2	3
ปกติ	ลดลงเล็กน้อย	ลดลงอย่างมาก	ลดลงอย่างมากที่สุด

8. <u>ความรู้สึกง่วงระหว่างวัน</u>

0	1	2	3
ไม่มีเลย	เล็กน้อย	มาก	มากที่สุด

Appendix 2. modified Athens insomnia scale-Thai

HN_____   ☐ชาย☐หญิง   อายุ___ปี   ครั้งที่☐ 1   ☐2

แบบสอบถามเพื่อสำรวจภาวะนอนไม่หลับฉบับภาษาไทย

Modified Athens Insomnia Scale (PMK): Thai version

แบบสอบถามฉบับนี้มีวัตถุประสงค์เพื่อประเมินว่าท่านมีเหตุการณ์หรือความรู้สึกดังแต่ละข้อต่อไปนี้

เกิดขึ้น"เกินกว่า 3 วันต่อสัปดาห์" ในเวลา 1 เดือน

0=0 สัปดาห์   1=1 สัปดาห์   2=2สัปดาห์   3=3-4สัปดาห์

กรุณาทำวงกลมรอบตัวเลข เพื่อระบุเหตุการณ์หรือความรู้สึกดังกล่าว

1. หลับยาก (เวลาตั้งแต่เริ่มนอนจนหลับได้จริงนานกว่าปกติ)

0	1	2	3
ไม่มี	มีบ้าง	มีบ่อย	มีบ่อยมาก

2. ตื่นกลางดึก

0	1	2	3
ไม่มี	มีบ้าง	มีบ่อย	มีบ่อยมาก

3. ตื่นเร็วกว่าปกติ

0	1	2	3
ไม่มี	มีบ้าง	มีบ่อย	มีบ่อยมาก

4. ระยะเวลานอนโดยรวม

0	1	2	3
เพียงพอ	พอใช้	ปานกลาง	ไม่เพียงพอ

5. คุณภาพการนอนโดยรวม

0	1	2	3
ดีมาก	ดี	พอใช้	ไม่ดี

6. รู้สึกสดชื่นระหว่างวัน

0	1	2	3
ดีมาก	ดี	พอใช้	ไม่ดี

7. สภาพร่างกายและจิตใจในระหว่างวัน

0	1	2	3
ดีมาก	ดี	พอใช้	ไม่ดี

8. รู้สึกง่วงระหว่างวัน

0	1	2	3
ไม่มี	มีบ้าง	มีบ่อย	มีบ่อยมาก