

Reliability and Validity of Thai Version Quality of Life Questionnaire (OSA-18) for Pediatric Obstructive Sleep Apnea

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Background: Obstructive sleep apnea-hypopnea syndrome (OSAHS) is a chronic illness affecting either cardiopulmonary or neuropsychiatric function. Besides the functional health, the quality of life of patients with obstructive sleep apnea (OSA) is of interest in literature. In children, the quality of life questionnaire, which consists of 18 items (OSA-18), has been widely accepted as a reliable, valid, and simple to administer. This questionnaire may also be useful in Thai children with OSA.

Objective: To assess the reliability and validity of the Thai version of OSA-18 in Thai children.

Material and Method: This was a cross-sectional study. The original English version of the 18-item pediatric obstructive sleep apnea quality of life questionnaire was translated into Thai following the guidelines of cross-cultural adaptation with permission from Rosenfeld RM, Department of Otolaryngology, SUNY Health Science Center at Brooklyn, USA. The questionnaire was divided into five domains, sleep disturbance, physical suffering, emotional distress, daytime problems, and caregiver concerns. The suspected obstructive sleep apnea children, aged less than 15 years, who did not have cardiovascular diseases, lung diseases, or neuromuscular diseases, and who underwent standard full night polysomnography were included. The child's caregiver was asked to complete the questionnaire without assistance to determine its reliability and validity.

Results: Forty-three children (30 boys, and 13 girls) were enrolled in the present study. The median age was five years (range 2 to 14 years). The median apnea hypopnea index (AHI) was six events/hour and median OSA-18 total score was 66.7 (range 25 to 107). There were excellent test-retest reliability (Cronbach's alpha = 0.91) and internal consistency (Cronbach's alpha = 0.77) between each domain. Correlation between the Thai OSA-18 total scores and AHI was $r = 0.48$, $p = 0.001$, which was similar to the original English version ($r = 0.43$, $p < 0.001$).

Conclusion: The level of reliability and validity of the Thai version of the OSA-18 has been found to be satisfactory. Therefore, this instrument can be used in future research for measuring the quality of life in Thai children with OSA and assess the benefit of treatment.

Keyword: Obstructive sleep apnea-hypopnea syndrome, Children, Questionnaire (OSA-18)

J Med Assoc Thai 2015; 98 (5): 464-71

Full text. e-Journal: <http://www.jmatonline.com>

Obstructive sleep apnea/hypopnea syndrome (OSAHS) is defined as a disorder of breathing during sleep, characterized by prolonged partial upper airway obstruction and/or intermittent complete obstruction (obstructive apnea) that disrupts normal ventilation during sleep and normal sleep patterns⁽¹⁾. The prevalence of parent-reported apneic events during sleep is in the range of 0.2 to 4%⁽²⁾. In Thailand, a survey in school-aged children found that 0.69% had OSAHS⁽³⁾.

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OSAHS is a common chronic illness, with consequence in the neurobehavior, cardiopulmonary, metabolic systems, and somatic growth. It is highly plausible that common pathogenic mechanisms are triggered by the interactions of intermittent hypoxia and hypercapnia, repeated intrathoracic pressure swings, and episodic arousal⁽⁴⁾. OSAHS is usually diagnosed by clinical criteria. Although polysomnography (PSG) is considered the gold standard for assessing the severity of OSAHS and outcomes of treatment, the clinical evaluations may not necessarily reflect the impact of the disease on patient's quality of life (QOL). Health related quality of life (HRQOL) instruments usually assess the patient's subjective perception of the impact of disease and treatment in multiple dimensions of

health status, based on patient report⁽⁵⁾. Besides the functional health, the effect of OSAHS on QOL is of interest in literature.

The most widely accepted definition of “Health” is a state of optimum physical mental and social well-being and not merely the absence of disease and infirmity⁽⁶⁾. The health domain ranges from negatively valued aspects of life to the more positively valued aspects. The boundaries of definition usually depend on why one is assessing health as well as the particular concerns of patients, clinicians, and researchers.

The quality of life for children with obstructive sleep apnea (OSA-18) was developed by Franco et al, which was first reported in 2000⁽⁷⁾. The OSA-18 is the most widely utilized QOL instrument in pediatric OSAHS literatures because it is a brief, easily

administered questionnaire, which is ideal for use during patient encounters. It may also be used to reliably measure the subjective aspects of OSA related QOL.

The OSA-18 consists of 18 items grouped in five domains of sleep disturbance (4 items), physical suffering (4 items), emotional distress (3 items), daytime problems (3 items), and caregiver concerns (4 items). Each item is scored in a seven-point Likert scale (1 = none of the time, 2 = hardly any of the time, 3 = a little of the time, 4 = some of the time, 5 = good amount of the time, 6 = most of the time, and 7 = all of the time), as shown in Fig. 1. The OSA-18 has been validated as both evaluative and discriminative instrument in pediatric OSAHS.

From literature reviews in Thailand, there has been neither a national nor a translated instrument for

OSA-18 Quality of Life Survey
Evaluation of Sleep-Disordered Breathing

Instructions. For each question below, please circle the number that best describes how often each symptom or problem has occurred during the past 4 weeks (or since the last survey if sooner). Thank you.

	None of the time	Hardly any of the time	A little of the time	Some of the time	A good bit of the time	Most of the time	All of the time
SLEEP DISTURBANCE							
During the past 4 weeks, how often has your child had...							
...loud snoring?	1	2	3	4	5	6	7
...breath holding spells or pauses in breathing at night?	1	2	3	4	5	6	7
...choking or gasping sounds while asleep?	1	2	3	4	5	6	7
...restless sleep or frequent awakenings from sleep?	1	2	3	4	5	6	7
PHYSICAL SUFFERING							
During the past 4 weeks, how often has your child had...							
...mouth breathing because of nasal obstruction?	1	2	3	4	5	6	7
...frequent colds or upper respiratory infections?	1	2	3	4	5	6	7
...nasal discharge or runny nose?	1	2	3	4	5	6	7
...difficulty in swallowing foods?	1	2	3	4	5	6	7
EMOTIONAL DISTRESS							
During the past 4 weeks, how often has your child had...							
...mood swings or temper tantrums?	1	2	3	4	5	6	7
...aggressive or hyperactive behavior?	1	2	3	4	5	6	7
...discipline problems?	1	2	3	4	5	6	7
DAYTIME PROBLEMS							
During the past 4 weeks, how often has your child had...							
...excessive daytime drowsiness or sleepiness?	1	2	3	4	5	6	7
...poor attention span or concentration?	1	2	3	4	5	6	7
...difficulty getting out of bed in the morning?	1	2	3	4	5	6	7
CAREGIVER CONCERNS							
During the past 4 weeks, how often have the above problems...							
...caused you to worry about your child's general health?	1	2	3	4	5	6	7
...created concern that your child is not getting enough air?	1	2	3	4	5	6	7
...interfered with your ability to perform daily activities?	1	2	3	4	5	6	7
...made you frustrated?	1	2	3	4	5	6	7

Fig. 1 OSA-18 for children with OSAHS.

assessment QOL of pediatric OSAHS. The OSA-18 has waited for cross-cultural translation into the Thai language, and appropriate pre-testing of the translated questionnaire. There can be advantages of translating the OSA-18 into Thai and introducing the Thai version OSA-18 to determine the QOL of Thai children who suffer from OSAHS in clinical uses and research outcomes.

Objective

The objectives of the present study were to cross-culturally translate and establish the reliability and validity of the Thai version OSA-18 in Thai children.

Material and Method

Development of the Thai version of OSA-18⁽⁸⁻¹¹⁾

The original English version of OSA-18 was translated into Thai following the guidelines of cross-cultural adaptation with permission from Rosenfeld RM, Department of Otolaryngology, SUNY Health Science Center at Brooklyn, NY, USA.

Step 1: Initial forward translation and synthesis of translation

The original English version was independently translated by two Thai experts of pediatric OSA, bilingual in Thai and English. No consultation among them was allowed. The translations were intended to be similar in meaning rather than literal translation and easy to comprehend. Both translated versions were reviewed for reconciliation of forward translation by an independent translator.

Step 2: Back-translation of reconciled version (Thai into English)

Another bilingual pediatrician translated the questionnaire back from Thai into English language. The translator did not see the original English questionnaire, nor did she consult with others.

Step 3: Assessment of comparability

All versions were independently reviewed by another two bilingual experts of pediatric OSA, item by item, to confirm equivalence and cultural suitability. Three measures of comparability used were conceptual equivalence, clarity, and colloquial language, with scales ranging from 1 (poor) to 5 (excellent). Mean scores were determined for each question, with the accepted mean score being above 3.

Subjects

Children aged less than 15 years with suspicion of OSAHS were enrolled from patients who underwent PSG. The respective caregivers were also required to understand the nature of the research and able to give informed consent. Patients were excluded if they were known to have cardiovascular diseases, lung diseases, neuromuscular diseases, mental retardation, or other illnesses that might have an impact on quality of life such as psychiatric diseases, craniofacial anomalies, or previous adenotonsillectomy, or if a caregiver who could not communicate in Thai. The study was conducted between March and October 2007 at Ramathibodi Hospital, Mahidol University, Bangkok. During enrollment, demographic data, clinical histories, and clinical signs were collected. The final Thai version OSA-18 questionnaire was completed by caregivers themselves without assistance. The same group was also asked to complete the same questionnaire one week later to establish test-retest reliability. The present study was approved by the Institute Review Board committee on Human Rights Related to Researches Involving Human Subjects Faculty of Medicine of Ramathibodi Hospital, Mahidol University.

Polysomnography

All subjects underwent an overnight PSG with Alice 3 (Respironic, Inc., Georgia, USA) by a trained sleep technician. PSGs were performed in a dimly-lit room with the patient sleeping in a comfortable bed. Standard PSG (Alice3[®], Respironic, Georgia, USA) consisted of electrocardiogram, electroencephalogram, electro-oculogram, electromyogram of mentalis and bilateral anterior tibialis muscles, finger pulse oximeter, end-tidal carbon dioxide, oronasal air flow (thermistors), pressure transducer, thoracic and abdominal pneumobelts, and neck microphone. All PSG data were recorded and manually scored by an experienced sleep technician and confirmed by board-certified sleep clinicians.

In addition, the following physiologic parameters were recorded, mean oxygen saturation, minimum oxygen saturation, percentage of time the saturation was below 92%, end-tidal CO₂, total sleep time in minutes, sleep efficiency, and percentage of time the child spent in rapid eye movement (REM) sleep⁽¹⁾. The patients were studied while breathing room air. Apnea-hypopnea index (AHI) is the total number of apneas and hypopneas per hour of total sleep time. The severity of OSAHS was graded as normal

(AHI ≤ 1 event/hour), mild (AHI 1-5 events/hour), moderate OSAHS (AHI $>5-10$ events/hour), and severe OSAHS (AHI ≥ 10 events/hour)⁽¹⁾. This research used Stanford 1996 scoring criteria because we wish to compare with previous studies.

Statistical analysis

Descriptive statistics were presented as mean \pm standard deviation. The present study aimed to evaluate psychometric properties.

Reliability

The ability of the instrument gives reproducible results when the clinical stage is stable. Test-retest reliability suggests that all relevant factors remain unchanged and give the same response when the tool is administered a second time. Internal consistency suggests that items within a domain should correlate with each other enough to assess the same concept. To assess reliability, Cronbach's alpha coefficient was computed for evaluation of the test-retest reliability and internal consistency for each question score and total OSA-18 score. The value of greater than 0.70 was regarded as good reliability⁽⁷⁾.

Validity

Validity implies that it does measure what it sets out to assess. Pearson's correlation coefficients were computed for associations among OSA-18 scores and AHI. Correlation coefficients were rated as very weak ($r < 0.2$), weak ($r = 0.20-0.35$), moderate ($r = 0.35-0.50$), and strong ($r > 0.5$). A two-tailed p -value less than 0.05 was considered statistically significant⁽⁷⁾. All statistical calculations were performed using SPSS version 15.0 (Chicago, USA).

Results

Thai version OSA-18 questionnaire

The OSA-18 questionnaire was translated through cross-cultural translation. All translated questions had mean conceptual equivalence, clarity, and colloquial language scores were ≥ 4 which meant good translation.

Demographic and baseline characteristics

During a 10-month study period, forty-three children having a median age of five years (range 2-14 years) were enrolled. There were 30 boys (69.8%) and 13 girls (30.2%). The median AHI was 6.0 events/hour (range 0-56.6) and mean OSA-18 total score was 66.7 (range 25-107). According to the American Sleep

Disorders Association criteria, there were 20 patients with mild OSAHS, seven patients with moderate OSAHS, and 16 patients with severe OSAHS. Based on BMI classification, 20 children (46.5%) were underweight, 16 children (37.2%) were normal, seven children (16.3%) were overweight, and none was obese. All caregivers completed the Thai version OSA-18 without asking questions about the comprehension of words or sentences in the questionnaire. Table 1 showed the mean and range score of the Thai version OSA-18 questionnaire domains. The maximum score of sleep disturbance, physical symptoms, emotional symptoms, daytime function, and caregiver concerns are 28, 28, 21, 21, and 28 respectively. The highest mean score was caregiver concern (median = 16.74) and the lowest median score was daytime function (mean = 9.7).

Table 2 and 3 showed the reliability internal consistency and correlation of Thai version OSA-18 questionnaire domains. Table 2, every domain had test-retest reliability and internal consistency more than 0.7, which showed good reliability. Sleep disturbance, daytime problem, and total OSA-18 score showed a good correlation with AHI ($p < 0.05$). Table 3, breath holding/pauses, choking or gasping, and difficult awakening had a strong correlation with AHI (correlation > 0.5). Loud snoring, fragmented sleep, daytime drowsiness, caregiver worried over child's health, and caregiver concerned not enough air had a moderate correlation with AHI (correlation $> 0.35-0.5$). Others had poor correlation.

Reliability of Thai version OSA-18

All questions had excellent test-retest reliability, which ranged from 0.72 to 0.96. The Cronbach's alpha coefficient values of test-retest reliability for each domain ranged from 0.72 to 0.94, and total OSA-18 score yielded a value of 0.91. All

Table 1. Mean and range of each domain and total OSA-18 score

Domain score	Mean	Range
Sleep disturbance (28)	14.30	4-26
Physical symptoms (28)	14.84	4-20
Emotional symptoms (21)	9.84	3-18
Daytime function (21)	9.70	3-21
Caregiver concerns (28)	16.74	4-28
Total OSA-18 score	66.70	25-107

OSA = obstructive sleep apnea

Table 2. Reliability of each domain and total OSA-18 score and correlation with AHI

Domain	Test-retest reliability	Internal consistency	Correlation	p-value
Sleep disturbance	0.85	0.87	0.55	<0.001**
Physical suffering	0.94	0.76	0.14	0.39
Emotional distress	0.75	0.85	0.23	0.11
Daytime problems	0.80	0.74	0.42	0.004**
Caregiver concern	0.72	0.87	0.25	0.85
Total OSA-18 score	0.91	0.77	0.48	0.001**

OSA = obstructive sleep apnea; AHI = apnea-hypopnea index

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 3. Correlation of each question with AHI

Item	Content	Correlation	p-value
	Sleep disturbance		
1	Loud snoring	0.45	0.003**
2	Breath holding/pauses	0.63	<0.001**
3	Choking or gasping	0.57	<0.001**
4	Fragmented sleep	0.37	0.015*
	Physical symptoms		
5	Mouth breathing	0.23	0.132
6	Frequent colds or URIs	0.20	0.205
7	Rhinorrhea	0.21	0.169
8	Dysphagia	0.01	0.967
	Emotional symptoms		
9	Mood swing or tantrums	0.29	0.160
10	Aggressive or hyperactivity	0.16	0.305
11	Discipline problems	0.28	0.071
	Daytime function		
12	Daytime drowsiness	0.42	0.005**
13	Poor attention span	0.25	0.104
14	Difficult awakening	0.51	<0.001**
	Caregiver concerns		
15	Caregiver worried over child health	0.38	0.012*
16	Caregiver concerned not enough air	0.41	0.007**
17	Caregiver missed activities	0.14	0.385
18	Caregiver frustration	0.24	0.128

AHI = apnea-hypopnea index; URIs = upper respiratory infections

* Correlation is significant at the 0.05 level (2-tailed).

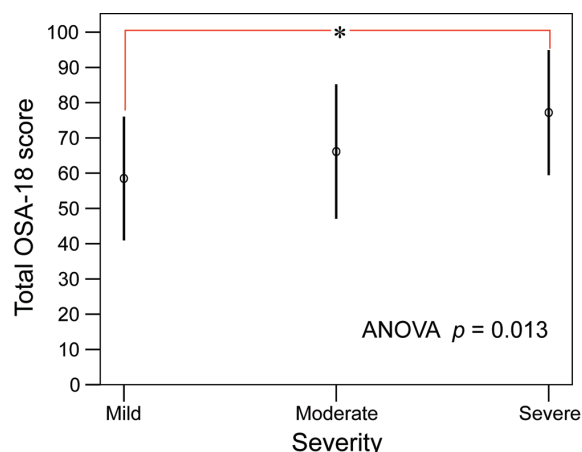
** Correlation is significant at the 0.01 level (2-tailed).

domain scores and total OSA-18 score showed good internal consistency. The values of internal consistency for each domain ranged from 0.74 to 0.87. The total score yielded a value of 0.77 indicating that its reliability was acceptable.

Validity of Thai version OSA-18

The moderate correlation coefficient of OSA-18 total scores and AHI was significant ($r = 0.48$, p -value = 0.001). The strongest significant correlation was the question about breath holding/pause ($r = 0.63$, p -value <0.001). The domains that were significantly correlated with AHI included sleep disturbance ($r = 0.55$, p -value <0.001) and daytime problems ($r = 0.42$, p -value = 0.004).

Fig. 2 shows the bar plot between mean \pm SD total scores and severity of OSAHS. The mean total OSA-18 score of the mild group was 58.50 (range 25-89), the moderate group 66.14 (range 40-102), and the severe group 77.19 (range 42-107). When the means were compared by one way ANOVA, the result revealed a significant difference between the mild group and severe group ($p = 0.013$), but no significant



Bar plot showing mean \pm SD total OSA-18 score for each AHI severity. * One way ANOVA, $p = 0.013$

Fig. 2 Bar plot showing OSA-18 total score in each category of OSAHS severity.

difference between the moderate group and the others was found.

Discussion

Many QOL instruments are in the English language. Therefore, the utilization in other languages requires accurate validated translation and awareness that they are specific to a social culture⁽⁹⁾. Even if the translation is accurate, cultural differences can adversely affect an instrument's measurement properties. Therefore, validation is important.

Determination of reliability and validity is required to confirm that there is no influence of the cultural differences. As shown in the present study, the results revealed that the Thai version OSA-18 had the excellent values of test-retest reliability and the internal consistency, which was above the accepted standard of more than 0.70 in each domain and total score. This was similar to the results reported with the original OSA-18 questionnaire. Our value of correlation of Thai version OSA-18 was 0.48, *p*-value 0.001, which showed a moderate correlation between total score and AHI, nevertheless, this was similar to the original version OSA-18 (*r* = 0.43, *p*-value <0.001)⁽⁷⁾.

Silva et al⁽¹²⁾, showed that the highest mean scoring domain was caregiver concern, which was similar to the present study.

Breath holding/pauses, choking or gasping and difficulty awakening had a strong correlation with AHI (correlation >0.5).

Loud snoring, fragmented sleep, daytime drowsiness, caregiver worrying over child health, and caregiver concern about not enough air had a moderate correlation with AHI (correlation >0.35-0.5). The prevalence of excessive daytime sleepiness in children was unclear. It might depend on the caregiver's perception and report⁽⁴⁾.

The daytime sleepiness and attention deficit are caused by sleep fragmentation, which is repeatedly interrupted by arousals⁽⁴⁾. The present study revealed that the total OSA-18 score, sleep disturbance domain, and daytime symptom domain were significantly correlated with AHI. However, the correlation with snoring arousal index was not found.

In the present study, OSAHS clearly affected both child and caregiver. Children with severe OSAHS did not necessarily have worse quality of life than children with mild OSAHS. Therefore, health related QOL instruments are not used as both the diagnostic scales and the disease/symptom severity scales⁽⁵⁾,

because PSG determines the physiologic parameters during sleep, whereas OSA-18 relies on caregiver proxy to assess a child's symptoms and behavior. Based on systematic review, Brietzke et al⁽¹³⁾, found that the use of the clinical history and physical examination alone in comparison to overnight PSG were not adequate to diagnose OSAHS. The incidence of apnea peaks during rapid eye movement (REM) sleep. During the REM period⁽¹⁴⁾, caregivers may not recognize events of apnea of their children. In addition, some caregivers may not sleep in the same room with their children.

The present study found that children suffering from severe OSAHS had a mean total score significantly higher than those having mild OSAHS.

In addition, the physician can use OSA-18 to follow-up the patient in some domains such as hyperactivity or poor attention span. Further study is needed to assess the improvement of QOL after surgical or medical therapy.

There are some limitations of our study, because only seven patients were diagnosed with moderate OSAHS, Thus, the modest amount of this group cannot allow us to compare the mean total OSA-18 score among mild versus moderate and moderate versus severe OSAHS. These groups need to be further evaluated after this pilot study, so as to reach more clarity as to how well the OSA-18 questionnaire can help to distinguish between these different clinical severity states. (This is different from the original study, which had a significant association between the total OSA-18 score and the severity of OSAHS. They recommended⁽⁷⁾ that scores less than 60 suggested a small impact on QOL, scores between 60 and 80 suggested a moderate impact, and scores above 80 suggested a large impact.) Based on previous grading, the present study has shown that the impacts of OSAHS were 16 (37%) of children had a small impact, 17 (40%) of children had a moderate impact, while 10 (23%) of children had a large impact on QOL. Since the proportion of moderate or severe impact is high (63%), therapeutic surgical or medical intervention is recommended.

Conclusion

The reliability and validity of the Thai version OSA-18 has been proven to be satisfactory from the present study. This instrument can therefore be used in future research to assess the quality of life in Thai children with OSA after interventions.

Key messages

- The prevalence of this complication of childhood obstructive sleep apnea is very high.
- The quality of life questionnaire can assess the caregivers subjective perception of the impact of disease and treatment.
- The present study found that the OSA-18 questionnaire has a good correlation between total score and the severity of obstructive sleep apnea-hypopnea syndrome.
- This questionnaire can be used to assess the quality of life in OSA children after interventions and to detect or manage some specific conditions such as, behavioral and learning problems.

Acknowledgements

The present study was funded by a Ramathibodi Research Grant, Mahidol University, Bangkok, Thailand.

Potential conflicts of interest

None.

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การศึกษาความแม่นยำและความถูกต้องของแบบสอบถามภาษาไทย (OSA-18) สำหรับผู้ป่วยเด็กที่มีภาวะทางเดินหายใจอุดกั้น

ธีรเดช คุปตานนท์, จารุวรรณ ชูกำเนิด, อัญชลี ลี้จากภัย, อรุณวรรณ พงุทธิพันธุ์

ภูมิหลัง: ภาวะทางเดินหายใจอุดกั้นสามารถทำให้เกิดภาวะแทรกซ้อน เช่น ระบบปอด ระบบหัวใจและหลอดเลือด หรือ ระบบประสาทและจิตใจ ในผู้ป่วยเด็กมีการศึกษาถึงคุณภาพชีวิตโดยใช้ OSA-18 ซึ่งเป็นที่ยอมรับในระดับสากล จึงเป็นที่มาของการศึกษาเพื่อนำแบบสอบถามนี้มาแปลและประเมินเพื่อใช้ในเด็กไทย

วัตถุประสงค์: เพื่อศึกษาความแม่นยำและความถูกต้องของแบบสอบถามภาษาไทย (OSA-18)

วัสดุและวิธีการ: เป็นการศึกษาวิเคราะห์แบบสอบถามในช่วงเวลาที่ทำการศึกษา โดยแบบสอบถามต้นฉบับได้ถูกแปลเป็นภาษาไทยโดยแบบมาตรฐานสากล และได้รับการอนุญาตจาก Richard M Rosenfeld MD โดยแบบสอบถามนี้มี 5 กลุ่ม ได้แก่ sleep disturbance, physical suffering, emotional distress, daytime problem, caregiver concern โดยแบ่งเป็นระดับ 1 ถึง 7 ผู้ป่วยที่เข้ารับการศึกษามีได้แก่ ผู้ป่วยที่ทางเดินหายใจมีการอุดกั้น อายุน้อยกว่า 15 ปี และไม่มีปัญหาอื่น เช่น ระบบปอด ระบบหัวใจและหลอดเลือด หรือ กล้ามเนื้ออ่อนแรง ผู้ป่วยจะได้รับการตรวจปัญหาการนอนหลับ (polysomnography) แล้วนำข้อมูลจากการตรวจและแบบสอบถามมาวิเคราะห์หาความแม่นยำและความถูกต้อง

ผลการศึกษา: มีผู้ป่วยเข้าร่วมการศึกษารวม 43 ราย แบ่งเป็นเพศชาย 30 ราย เพศหญิง 13 ราย อายุเฉลี่ย 5 ปี (range 2-14 ปี) จากผลการตรวจพบว่ามีภาวะหยุดหายใจและหายใจลำบาก ต่อชั่วโมงเฉลี่ย 6 ครั้ง/ชั่วโมง และผลแบบสอบถาม OSA-18 มีค่าเฉลี่ย 66.7 (range 25-107) และประเมินความถูกต้องและความสัมพันธ์ของคำถามอยู่ในเกณฑ์ดีเยี่ยม Cranbach's alpha 0.91 และ 0.77 ตามลำดับ และพบว่าความสัมพันธ์ของ OSA-18 และภาวะหยุดหายใจ หายใจลำบากต่อชั่วโมง อยู่ในเกณฑ์ดี ($r = 0.48, p = 0.001$) เทียบเท่ากับต้นฉบับเดิม ($r = 0.43, p < 0.001$)

สรุป: ผลการศึกษาพบว่าความแม่นยำและความถูกต้องของแบบสอบถามภาษาไทย OSA-18 มีผลที่น่ายอมรับเชื่อถือได้ และแบบสอบถามนี้สามารถนำมาใช้ในการศึกษาต่อไปของคุณภาพชีวิตของผู้ป่วยเด็กไทยที่มีภาวะทางเดินหายใจอุดกั้น และสามารถใช้เป็นเครื่องมือในการติดตามและประเมินประโยชน์ของการรักษาได้
