

# Practice, self-confidence and understanding of pediatric obstructive sleep apnea survey among pediatricians

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## ABSTRACT

**Background.** Pediatricians play an important role in the screening, diagnosis and management of childhood obstructive sleep apnea (OSA). This study used a questionnaire to explore the knowledge, self-confidence and general practices of childhood OSA among Thai pediatricians.

**Methods.** This was a descriptive cross-sectional survey study, using a newly developed questionnaire; including: 21 knowledge items, 4 self-confidence items, questions regarding OSA screening, number of OSA cases per month and OSA management.

**Results.** A total of 307, convenient pediatricians; from different types of hospitals across all regions of Thailand, participated in this study. The median, total knowledge score was 19 (range 14–21). Two-thirds of the respondents felt confident/extremely confident in their ability to identify and manage children with OSA. The average number of OSA cases reported by pediatricians was 5.9 cases per month. During a general medical check-up, 86.6% of the respondents did not routinely ask about OSA symptoms. Significant odds ratios (ORs) for the use of montelukast, as the first-line drug for OSA in young children, were observed in pediatric allergists and pulmonologists (adjusted OR 2.58, 95% CI 1.11–6.01 and adjusted OR 2.20, 95% CI 1.2–4.02) ( $P = 0.008$ ), respectively, compared to general pediatricians and other sub-specialties.

**Conclusions.** Pediatricians had a high level of overall OSA knowledge, and good self-confidence in identifying and managing children with OSA. However, a low recognition rate and unawareness of OSA screening were observed.

**Key words:** knowledge, pediatricians, practice, obstructive sleep apnea, self-confidence.

Obstructive sleep apnea (OSA) is the most common form of sleep-disordered breathing (SDB) in children. It is characterized by prolonged and repetitive partial or complete upper airway obstruction during the sleep period that results in hypoxemia and hypercapnia, which affects sleep quality.<sup>1-3</sup> Undiagnosed or untreated childhood OSA may lead to a significant negative effect on health-related quality of life and cause serious cardiovascular complications, metabolic abnormalities, neurocognitive and behavioral problems and a failure to thrive.

Early recognition and treatment of childhood OSA is crucial to prevent morbidity and to also provide better quality of life for both children and their families.

Routine screening for SDB in primary pediatric care settings has been recommended by the American Academy of Pediatrics (AAP) since 2012.<sup>4</sup> However, many previous studies showed unawareness, low recognition rate, and under management of children with OSA among community-based primary care physicians and academic settings.<sup>5,6</sup> Some studies reported improvement of care in childhood OSA was associated with better knowledge, positive attitudes and formal education in childhood OSA.<sup>7,8</sup>

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Pediatricians are the key people, who play an important role in the screening, diagnosis, and management of childhood OSA; however, currently there is no information regarding knowledge, self-confidence and practices related to childhood OSA in Thailand. The Thai guidelines for childhood obstructive sleep apnea was first published in 2015, to provide a national standard practice guideline for the diagnosis and management of OSA among the pediatric population.<sup>9</sup> In spite of the available guideline, a knowledge gap still persists, and the practices of OSA treatment continue to be heterogeneous. Therefore, this study used a questionnaire to explore the knowledge, self-confidence, and general practices of childhood OSA among Thai pediatricians. The outcome measurement of this study may contribute to a better understanding of the importance of OSA, and the confidence of pediatricians in their ability to screen, diagnose and manage childhood OSA.

## Material and Methods

### *Study design and population*

This study was a descriptive cross-sectional survey study, conducted from January to March, 2019; using the questionnaire to assess the knowledge, self-confidence and general practices of childhood OSA among Thai pediatricians. The study was approved by the Human Research Ethics Committee of the Faculty of Medicine, Prince of Songkla University at 7th February 2019 (REC.62-001-1-1). The study participants consisted of convenient pediatricians who were currently working in Thailand.

### *Sample size calculation*

The sample size was calculated based on an estimate of the finite population proportion equation.<sup>10,11</sup> It was estimated that 80% of Thai pediatricians had good knowledge and self-confidence scores (higher than 80%). It also was determined that a sample size of

257 pediatricians was required to represent the population of Thai pediatricians, with a sampling error of 5% at a 95% confidence level and 10% allowed for non-respondents.

### *Developing the questionnaire*

A newly developed questionnaire was used to evaluate the knowledge, self-confidence and practices of Thai pediatricians in concerns to OSA. The questionnaire consisted of 3 parts.

#### *1. OSA knowledge part*

The OSA knowledge part consisted of 21 items, which were presented in a true or false format.

Validity testing of the knowledge items used the individual content validity index (I-CVI) method, by four pediatric pulmonologists. If at least 3/4 of the expert members gave the individual items a score of relevant or extremely relevant, then the items were considered for inclusion in the final questionnaire.

For internal consistency, a pilot test, conducted by 20 pediatric staff doctors, was used to assess the questionnaire's reliability. Cronbach's alpha by SPSS software was 0.572.

#### *2. Self-confidence part*

The self-confidence part consisted of 4 items, used to evaluate the confidence of pediatricians in their ability to identify children at risk of OSA, initiate treatment, and follow-up of the children with OSA as well as their confidence to give information.

#### *3. Practices part*

The practices part consisted of 3 items, used to evaluate the number of OSA cases each month, frequencies of performing history taking for OSA symptoms and therapies for OSA management.

### *Study Procedure*

The questionnaire was created on a Google form, and submitted to convenient pediatrician participants, using the Line application and E-mail. There was a consent paragraph in the

participant's information sheet, and an informed consent process was done in active voluntary action to complete the survey online. The questionnaires were completed anonymously.

### Data management and analysis

Data were collected from the Google forms, and the analysis used R program version 3.5.1. For the knowledge parts, the total scores were presented as percentages, median and interquartile range (IQR).

The chi-square test, Kruskal-Wallis test, rank sum test, and the logistic regression model were used to assess the differences between the knowledge score and associated factors. Spearman's rank correlation was used to evaluate the relationship between the total knowledge score and self-confidence score. A P-value < 0.05 was considered statistically significant.

For practice items, the number of children with OSA in general practice is presented as mean. The frequency of history taking of OSA and OSA treatment are reported as percentages.

### Results

The convenient respondents totaled 307 pediatricians, ranging from 28 to 60 years of age. Characteristics of the respondents are shown in Table I. Most of the respondents were female (82.7%), and nearly half were general pediatricians (40.4%). More than half of the respondents had less than 10 years of experience, since pediatric board graduation. There were 128 community-based pediatricians and 147 pediatricians who worked in teaching hospitals. Most of the respondents worked in either central Thailand (45.3%) or southern Thailand (27.7%).

### OSA knowledge part

From the 21 knowledge items, the mean, total knowledge score was 18.5; with the median

**Table I.** Baseline characteristics of respondents (N = 307).

Characteristic	N (%)
Female	253 (82.7)
Age (years) (median; range)	37 (28-60)
Specialty training	
General pediatrician	124 (40.4)
Pediatric allergist	27 (8.8)
Pediatric pulmonologist	60 (19.5)
Other pediatric sub-specialist	96 (31.3)
Years since pediatric board graduation	
< 5	98 (31.9)
5-10	102 (33.2)
11-20	72 (23.5)
> 20	35 (11.4)
Working place	
Community-based hospital	128 (41.7)
Primary care hospital	20 (7.3)
Secondary care hospital	33 (12.0)
Private hospital/private clinic	59 (21.5)
Others	16 (5.2)
Teaching hospital	147 (47.9)
University hospital	66 (24.0)
Tertiary care hospital	81 (29.5)
Unknown	32 (10.4)
Location in Thailand	
Northern	26 (8.5)
Eastern	27 (8.8)
Northeastern	27 (8.8)
Western	3 (1.0)
Southern	85 (27.7)
Central	139 (45.3)
Total OSA knowledge score ≥ 80%	282 (91.9)
General knowledge score ≥ 80%	288 (93.8)
Identification & Evaluation knowledge score ≥ 80%	299 (97.4)
Management knowledge score ≥ 80%	176 (57.0)

being 19 (range 14-21). All sub-categorical knowledge domain scores are shown in Table I. The responses in each individual knowledge item are listed in Table II. Most of the knowledge items were answered correctly (range 63.8-99.7%).

**Table II.** Percentage of respondents answering each knowledge item correctly.

Question item	Correct response	N (%)
General knowledge of OSA		
1. Prevalence of childhood OSA in Thailand is 1–5%.	True	273 (88.9)
2. Children with OSA have attention deficit hyperactivity disorder as a complication.	True	306 (99.7)
3. Severe childhood OSA causes right side heart failure.	True	299 (97.4)
4. Obese children have a higher prevalence of OSA than the general childhood population.	True	293 (95.4)
5. Childhood OSA can be found in children with failure to thrive.	True	289 (94.4)
6. Severe degree of snoring is correlated with severe OSA in children.	False	235 (76.5)
Identification & evaluation of OSA		
7. The most common cause of childhood OSA is adenotonsillar hypertrophy.	True	299 (97.4)
8. Snoring $\geq 3$ nights/week is the chief complaint of childhood OSA.	True	227 (73.9)
9. Evaluation of tonsil size, facial deformity, signs and symptoms of allergic rhinitis should be done to find the cause of childhood OSA.	True	291 (94.8)
10. Children with suspected OSA should have a lateral soft tissue neck film taken.	True	265 (86.3)
11. Overnight pulse oximetry monitoring is a benefit for the diagnosis and severity assessment of OSA.	True	279 (90.9)
12. Polysomnography is the gold standard for the diagnosis of OSA.	True	302 (98.4)
Management knowledge of OSA		
13. Children with suspected OSA from history and physical examination should start treatment with an OSA medication. There is no need to wait for a confirmed diagnosis.	True	279 (90.9)
14. Montelukast is the first line drug for young children who are suspected of having OSA.	False	196 (63.8)
15. Systemic steroids are beneficial for the treatment of severe OSA.	False	210 (68.4)
16. Intranasal steroids help reduce the size of the tonsils and the adenoid gland.	True	268 (87.3)
17. Adenotonsillectomy has a good outcome for treatment of OSA > 85%.	True	251 (81.8)
18. OSA symptoms may be worse in the acute period after adenotonsillectomy.	True	266 (86.6)
19. Residual OSA after adenotonsillectomy can be managed by overnight CPAP.	True	303 (98.7)
20. Weight reduction for obese children can improve OSA symptoms.	True	305 (99.3)
21. Treatment of OSA in children is the same as in adults.	False	251 (81.8)

### **Factors associated with knowledge score**

We compared the total knowledge score and knowledge score in sub-categorical knowledge domains between specialty training using the Kruskal-Wallis test. Pediatric pulmonologists had a significantly higher, total knowledge score ( $P = 0.045$ ) as well as identification & evaluation score ( $P = 0.047$ ) than non-pulmonologist pediatricians. No difference in total knowledge score and sub-categorical knowledge domains were observed between pediatricians who

work in community or teaching hospitals, nor between  $\leq 10$  and  $> 10$  years of pediatrics practice experience (Table III).

### **Factors associated with incorrect answers in focus items**

The overall percentage of correct responses in the 4 knowledge items (items 6, 8, 14, and 15) was lower than 80%. Linear regression analysis was performed to evaluate the factor determinants of the incorrect answers in these focus items.

**Table III.** Factors associated with knowledge and sub-categorical knowledge score (N = 307).

Factors	N (307)	Total knowledge score	General knowledge score	Identification & Evaluation score	Management score
		median (IQR)	median (IQR)	median (IQR)	median (IQR)
<b>Specialty</b>					
Pediatric allergist	27	19 (17,20)	6 (5.5,6)	6 (5,6)	7 (6,9)
Pediatric pulmonologist	60	19 (18,20)	6 (5,6)	6 (5,6)	8 (7,8)
General pediatric & other specialties	220	19 (17.8,20)	6 (5,6)	6 (5,6)	8 (7,8)
		P = 0.045*	P = 0.06	P = 0.047*	P = 0.57
<b>Practice experiences (years)</b>					
≤ 10	200	19 (18,20)	6 (5,6)	6 (5,6)	8 (7,8)
> 10	107	19 (18,20)	6 (5,6)	6 (5,6)	8 (7,8.5)
		P = 0.90	P = 0.54	P = 0.29	P = 0.87
<b>Working place</b>					
Community-based hospital	128	18 (17,20)	6 (5,6)	6 (5,6)	7 (7,8)
Teaching hospital	147	19 (18,20)	6 (5,6)	6 (5,6)	8 (7,8)
Unknown	32	19 (18,20)	6 (5,6)	6 (5,6)	8 (7,9)
		P = 0.11	P = 0.27	P = 0.93	P = 0.06

For item 14, significant odds ratios (ORs) for the answer of montelukast being used as the first-line drug for young children suspected of OSA were observed in pediatric allergists (adjusted OR 2.89, 95% CI 1.27–6.58) and pulmonologists (adjusted OR 2.29, 95% CI 1.25–4.17) ( $P = 0.003$ ), respectively; compared to general pediatricians and other pediatric sub-specialties. For item 15, we found a significant ORs for pediatric allergists to respond incorrectly to the question of systemic steroids having a benefit for the treatment of severe OSA (adjusted OR 2.5, 95% CI 1.1–5.69;  $P = 0.04$ ); compared to general pediatricians and other sub-specialties. Item 8 asked about snoring more than 3 nights/weeks as the chief complaint of childhood OSA. Both general pediatricians and pediatric allergists had significant ORs of incorrect answers (adjusted OR 3.3, 95% CI 1.4–7.79) and 6.36 (95% CI 2.04–19.8) ( $P = 0.002$ ), respectively, compared to the pulmonologists.

#### Self-Confidence part

According to the self-confidence assessment, the median score of self-confidence was 12 (IQR 10,15) (range 4–16). Most of the respondents felt

confident/extremely confident in their ability to identify and manage children with OSA in all items (Table IV). However, the Spearman's rank correlation did not find a significant correlation between total knowledge score and self-confidence score ( $\rho = 0.095$ ,  $P = 0.09$ ).

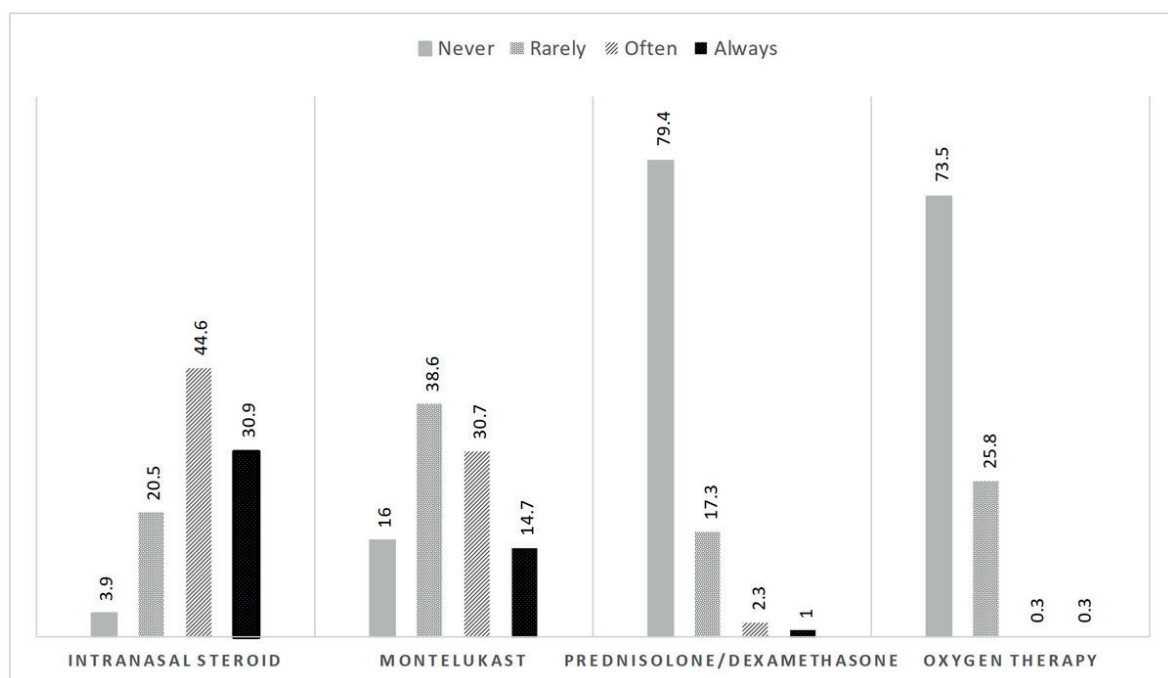
#### Practice part

Overall, Thai pediatricians in their practices saw an average of 5.9 cases per month (range 1–60) of childhood OSA, while the pediatric pulmonologists saw 15 cases per month of children with OSA. Seventy-one percent of Thai pediatricians "always" screened for OSA in obese children, but only 13.4% of Thai pediatricians "always" asked about OSA symptoms in general medical check-ups.

Figure 1 shows the percentage of therapies prescribed by Thai pediatricians for OSA management. Intranasal corticosteroids (INS) were "often/always" prescribed in 44.6% and 30.9%, respectively. Thirty-point seven percent of respondents reported "often" and 14.7% reported "always" as prescribing montelukast. Systemic corticosteroids (for example; prednisolone/dexamethasone) and oxygen

**Table IV.** Responses to self-confidence items (N = 307).

Self-confidence items	1	2	3	4
	Not confident	Slightly confident	Confident	Extremely confident
	N (%)	N (%)	N (%)	N (%)
1. I feel confident identifying children at risk for OSA.	4 (1.3)	67 (21.8)	151 (49.2)	85 (27.7)
2. I am confident in my ability to start treatment for OSA.	4 (1.3)	65 (21.2)	137 (44.6)	101 (32.9)
3. I am confident in my ability to manage and follow-up children with OSA.	8 (2.6)	90 (29.3)	138 (45.0)	71 (23.1)
4. I am confident in my ability to give the patient information on OSA.	2 (0.7)	59 (19.3)	147 (47.9)	99 (32.2)



**Fig. 1.** Percentages of therapies prescribed by Thai pediatricians for obstructive sleep apnea management.

therapy were rarely used for management of children with OSA.

**Discussion**

This PSU-OSA Survey aimed to explore Practice, Self-confidence, and Understanding of pediatric OSA among Thai pediatricians. This is the first childhood OSA survey in Thailand, since the Thai Guidelines for Childhood Obstructive Sleep Apnea was first published in 2015. Overall, the study found that Thai pediatricians had a high self-confidence score,

which indicated that they were confident in their ability to identify, their management, and follow-up of children with OSA. We found that among Thai pediatricians, 91.9% had a total OSA knowledge score  $\geq 80\%$ . Compared to a previous study in the United States; Uong et al.<sup>8</sup>, found that the mean knowledge score in pediatric OSA was 69.6%. Moreover, the results of surveys concerning adult OSA also had similar findings, where the overall knowledge scores ranged from 66% to 76%.<sup>12-14</sup> The results of this study had higher knowledge scores, because the population in this study included

only pediatricians; whereas the previous studies included primary physicians and pediatricians, additionally the question items were also different.

However, 4 of the 21 knowledge items were problematic. There was a discrepancy in the answers of item 14. The study results from the practice part showed that almost half of the responders prescribed montelukast to treat OSA in general practice. From a linear regression analysis we found significantly higher ORs in pediatric allergists (adjusted OR 2.89) and pulmonologists (adjusted OR 2.29) who answered that montelukast was used as the first line OSA therapy in young children, compared to the general pediatricians and other sub-specialties. This was possibly caused by young patients, particularly under the age of 3 years who were referred to the specialist, according to the recommendation of the Thai Guidelines for OSA. Furthermore, montelukast is approved for patients aged 6 months or older, that was younger than the age-approval of intranasal corticosteroids (INS), which is older than 2 years of age.<sup>15</sup>

When we focused on other items, the associated factors with incorrect answers were subspecialty, general pediatricians and pediatric allergists, who had significant ORs of incorrect answers. Different levels of training possibly had an effect on knowledge. Unlike a previous study, we didn't find significant differences in the incorrect answers in terms of years of practice or place of work. This may have implied that the national recommendations, which are accessible to all physicians, caused overall knowledge homogeneity.

We found that 87.3% of the responders knew that INS help reduced the size of the tonsils and the adenoid gland (item 16). Adenotonsillar hypertrophy is a common etiology of childhood OSA, but up to 24.4% of responders never or rarely used INS for the management of OSA. This finding exemplified a barrier of knowledge. Bridgeman MB. reported several barriers that can impede the use of INS, including concerns

about safety and steroid side effects; especially growth suppression, a child's resistance towards intranasal medication, undesirable sensations associated with intranasal administration, and misperceptions regarding the loss of response from frequent use.<sup>16</sup> The true barriers of INS among Thai pediatricians need to be explored.

Overall, in general practice of OSA, we found that Thai pediatricians saw 5.9 cases per month of children who were suspected of having OSA. However, in the sub-specialty analysis, general pediatricians reported only 2 cases per month, while pediatric pulmonologists reported an average of 15 cases per month. These findings reflect the fact that most childhood OSA patients in Thailand were seen by OSA specialists. Despite, the high level of OSA knowledge, and good self-confidence in OSA practice observed among general pediatricians, they reported a low number of patients in clinical practice. Interventions to encourage general pediatricians to participate in OSA practice may be needed.

Our study found that 86.6% of the responders did not routinely ask about OSA symptoms in general medical check-ups, in spite of the recommendations of AAP and the Thai guidelines for childhood OSA. These findings were consistent with a previous study from Erichsen and Rosen that offered evidence of a low OSA recognition rate and unawareness of pediatricians; particularly general pediatricians concerning the screening of OSA.<sup>6,7</sup> Therefore, interventions to increase OSA awareness and encouragement of pediatricians to perform history taking for OSA symptoms are needed to find children who are at risk of OSA. This would provide for early detection and optimize OSA management outcomes.

The strength of this study is the information on OSA practice in Thailand, based on an adequate sample size and the demographic data, which included: age, specialty training, years of pediatric experience and type of hospital. Although, our study discovered problems in the general practice of OSA, it may not explain the cause of the problems; particularly

in medications used to manage OSA and the barriers from knowledge to practice. More focus is needed on education and intervention, so as to identify and overcome the barriers for the use of INS.

This study has limitations. First, this study possibly had self-selection bias.<sup>17</sup> Additionally, the respondents were those who had access to Line application and Google form; so the calculation for non-respondents was added, and the final participant numbers were met. In addition, we could not calculate the number of non-respondents, because we could not access the list of Thai pediatrician emails due to confidentiality concerns.

Good knowledge and self-confidence in the management of childhood OSA was observed among Thai pediatricians; whereas, a low recognition rate and unawareness of OSA screening is still problematic. Misunderstandings in some knowledge points were identified; especially concerning medications, including INS and montelukast.

More research needs to focus on practice points; especially the use of INS and montelukast, which may provide a better understanding and overcome the barriers of OSA treatment. Intervention to encourage pediatricians to move from good knowledge to practice in OSA screening would provide early case detection and improve OSA management outcomes.

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