Research on Sleep Disordered Breathing in Children

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PSG at Ramathibodi Hospital

1995 - present

Childhood OSA at Ramathibodi Hospital

OBSTRUCTIVE SLEEP APNEA SYNDROME IN THAI CHILDREN DIAGNOSED BY POLYSOMNOGRAPHY

A Preutthipan, S Suwanjutha and T Chantarojanasiri

Department of Pediatrics, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand

Abstract. Overnight polysomnography was conducted in 39 Thai children with clinically suspected obstructive sleep apnea syndrome (OSAS) during the years 1994 to 1996. Eighty-five percent of these children met the polysomnographic criteria of pediatric OSAS, 42.4% among whom had severe OSAS. Male : female ratio of children with OSAS was 4.5:1. The peak age at the time of diagnosis was 3 to 4 years. The most common predisposing factor was adenoidal and tonsillar hypertrophy. Adenoidectomy and/or tonsillectomy was the most effective therapeutic option. Recovery of symptoms was observed following surgery and nasal continuous positive airway pressure.

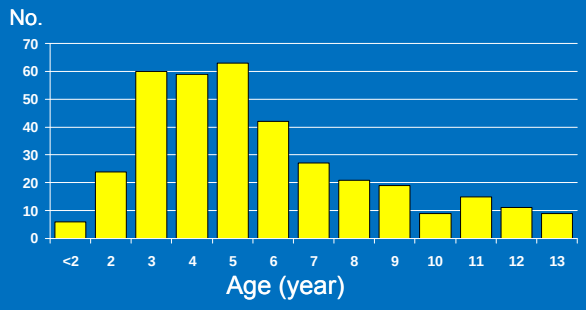
Preutthipan A, et al. **Southeast Asian Trop Med Public Health 1997**

1995-1997

Thai children underwent PSG (n=39)

- 33 (85%) met PSG criteria of OSA
- 14 (36%) had severe OSA
  - (OAI > 10, SpO_2 < 75%)
- Probably due to
  - Unawareness of physicians and parents
  - Limited access to sleep laboratories
- Boy : girl = 4.5 : 1
- Peak age 3-5 yr
- Adenotonsillectomy was the treatment of choice

Age Distribution
Thai Children with OSA



Pediatric Pulmonology 32:222–227 (2001)

Snoring and Obstructive Sleep Apnea in Thai School-Age Children: Prevalence and Predisposing Factors

Wanaporn Anuntaseree, MD,[1]* Korpong Rookkapan, MD,[2] Surachai Kuasirikul, MD,[3] and Paramee Thongsuksai, MD[4]

Pediatric Pulmonology 39:415–420 (2005)

Natural History of Snoring and Obstructive Sleep Apnea in Thai School-Age Children

Wanaporn Anuntaseree, MD,[1]* Surachai Kuasirikul, MD,[2] and Somchai Suntornlohanakul, MD[1]

Prevalence

- In 1,142 school children, aged 6-13 years
- At Hat Yai, Southern Thailand
- Habitual snoring 8.5%
- Snoring associated with
  - Allergic rhinitis (OR 3.96, 95% CI 1.3-12.2)
  - Tonsillar size (OR > 2.6)
  - Passive smoking (OR 1.75, 95% CI 1-3)

(Anuntaseree, Ped Pulm 2001)

Prevalence

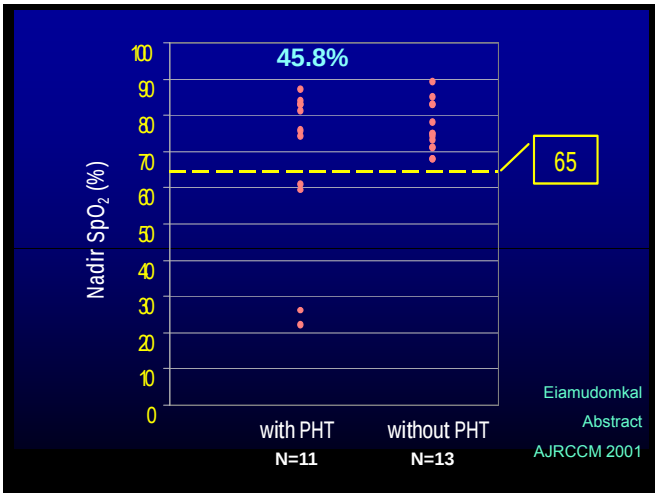
- In 1,142 school children, aged 6-13 years
- PSG conducted in 8 children, who reported sleep-related symptoms
  - 7 had AHI ≥ 1 /h.
  - None had severe OSA
- OSA 0.7%

(Anuntaseree, Ped Pulm 2001)

Pulmonary Hypertension Detected by Echo / EKG

- Found in 11 of 24 children with OSA
- Nadir SpO_2 < 65% was shown to be the most important predictive factor

Eiamudomkal A. et al. Abstract AJRCCM 2001



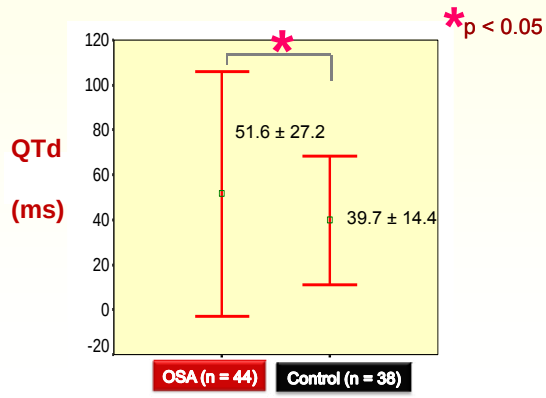
QT Dispersion in Childhood OSA

Khositseth A, Nantarakchaikul P, Kuptanon T, Preutthipan A.

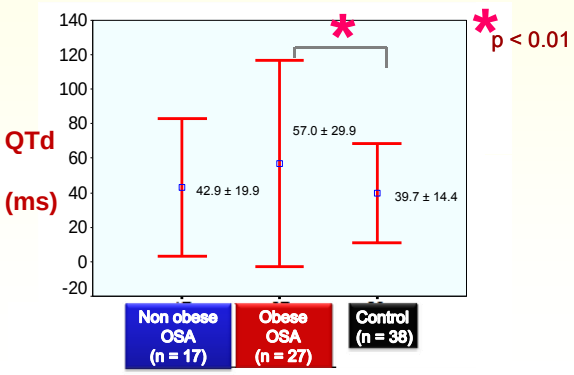
Cardiol Young 2011;21(2):130-5.

Department of Pediatrics, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand

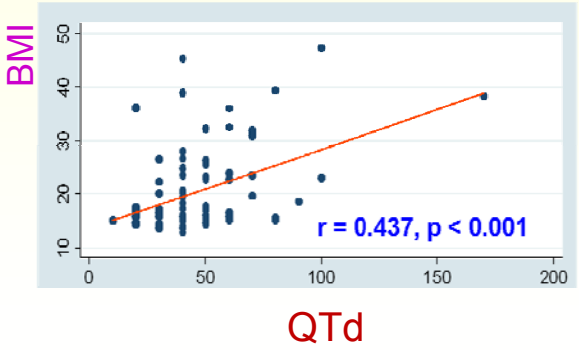
QTd of OSA vs. Control



QTd in OSA VS. Control



Correlation between QTd and BMI



Conclusion

- QTd was significantly increased in childhood OSA
- QTd was significantly correlated with BMI
- Obesity may be the important contributing factor for increased QTd in childhood OSA

Problems of Childhood OSA in Thailand

- Late diagnosis, more complications
- Shortage of Ped Sleep Lab
  - expensive
  - time and labor consuming
  - costly equipment
  - lack of well-trained sleep specialists and technicians

Alternative Diagnostic Techniques

Acta Paediatr 89: 708–12. 2000

Can parents predict the severity of childhood obstructive sleep apnoea?

A Preutthipan[1], T Chantarojanasiri[1], S Suwanjutha[1] and U Udomsubpayakul[2]

Division of Paediatric Pulmonology, Department of Paediatrics[1], and Statistical Unit, Research Centre[2], Faculty of Medicine, Ramathibodi Hospital, Bangkok, Thailand

Table 3. Validity of parents' observations in predicting severe OSAS.

	Sensitivity (%)	Specificity (%)
Observed cyanosis	35	92
Observed obstructive apnoea	61	65
Snoring extremely loudly	52	78
Shakes child to make him/her breathe	64	65
Watches child sleeping, afraid about breathing	85	41

Video Symptoms Questionnaire

(Answer YES or NO)

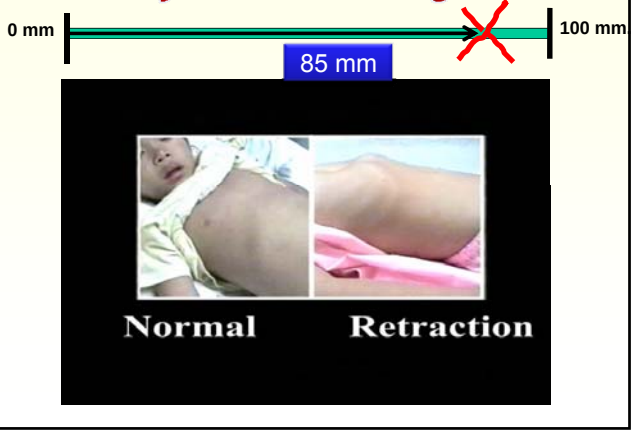
Preutthipan A, Chaiwerawattana S, Manoontham A.
Am J Respir Crit Care Med 2003;167:A676

Video Symptoms Questionnaire

Questions	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
1. Chest indrawing and abdominal distension	17	95	83	46
2. Lips turn blue	11	100	100	48
3. Intermittent pause of snoring while breathing very hard	26	86	70	49
4. Mouth breathing	21	96	86	50
5. Struggling to breathe with chest wall retraction	26	91	78	49
6. Intermittent pause of breathing followed by gasping for air	26	96	88	51

Preutthipan A, Chaiwerawattana S, Manoontham A.
Am J Respir Crit Care Med 2003;167:A676

Modify to Visual Analog Scale



Visual Analog Scale Questionnaire

	OSA (n=36)	Non OSA (n=19)	p-value
Retraction	22 (0 – 100)	0 (0 – 38)	0.014
Intermittent pause followed by gasping of air	28.5 (0 – 100)	0 (0 – 49)	0.009
Sum of all 6 questions (mm)	**130 (0 – 600)**	**43 (0 – 230)**	**0.006**

Visual Analog Scale Questionnaire

- The entire visual analog scale ≥ 40 mm was justified as a positive test.
- Sensitivity 83.3%, specificity 47.4%, PPV 75% and NPV 60%

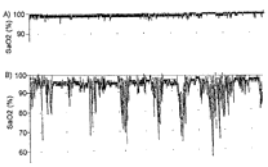
Chuen-im P, Preutthipan A, Kuptanon T, Okascharoen C. Young Investigator Award, CIPP 2008, Nice, France.

PEDIATRICS

Nocturnal Pulse Oximetry as an Abbreviated Testing Modality for Pediatric Obstructive Sleep Apnea

Robert T. Brouillette, MD*; Angela Morielli, MBA, RPSGT*; Andra Leimanis, BSc*
Karen A. Waters, MBBS, PhD‡; Rina Luciano, RRT*; and Francine M. Ducharme, MD*

Pediatrics 2000;105;405-412

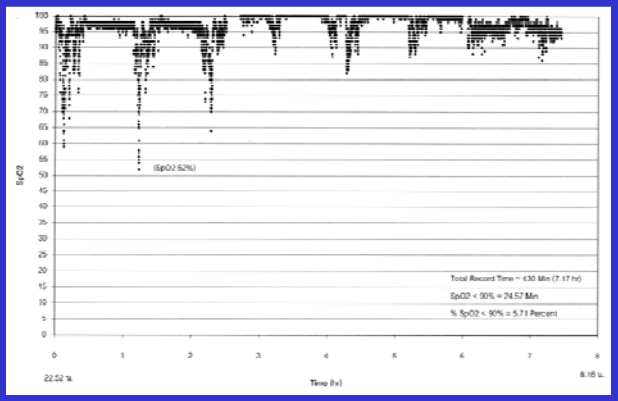


Negative predictive value 53%

Positive predictive value 97%

Overnight Pulse Oximetry at Ramathibodi

Cheeptinnakorntaworn P, Manoontham A, Preutthipan A.
Am J Respir Crit Care Med 2004;169:A687



Interpretation

- Define one cluster of desaturation as:
  - ≥ 10 dots of SpO_2 < 90% in 30 min. period
- If desaturation ≥ 3 clusters
  - Specificity 100%, Positive predictive value 100%
  - No false positive
- **BUT** negative result, without any cluster, cannot rule out OSA
  - False negative 26 %
  - There is 19% chance to have OSA

Can home video clips predict moderate-to-severe OSA in children?

Nongnaphat Chirawutthinan, MD
Teeradej Kuptanon, MD
Aroonwan Preutthipan, MD, FCCP

Patients were classified into 2 groups

Respiratory events of PSG : Defined according to the American Academy of Sleep Medicine for Scoring of Sleep and Associated Events (2012)

PSG	Diagnosis
AHI ≥ 10	Moderate to severe group
AHI ≥ 5, < 10	
AHI ≥ 1.5, < 5	Mild group
AHI < 1.5	

Multivariate logistic regression analysis for moderate-to-severe OSA

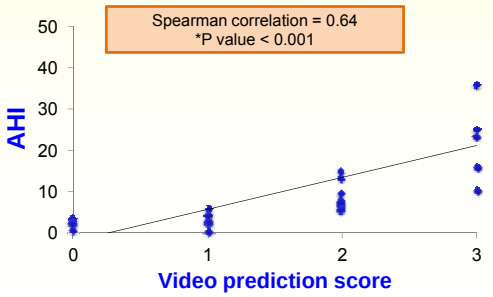
Respiratory pattern	Odds ratio	95% CI	P value
1. Paradoxical chest movement	9.78	1.1-93.1	0.04*
2. Continuous snoring	9.73	1.2-76	0.03*
3. Subcostal retraction	9.73	1.2-76.9	0.03*

* P value < 0.05

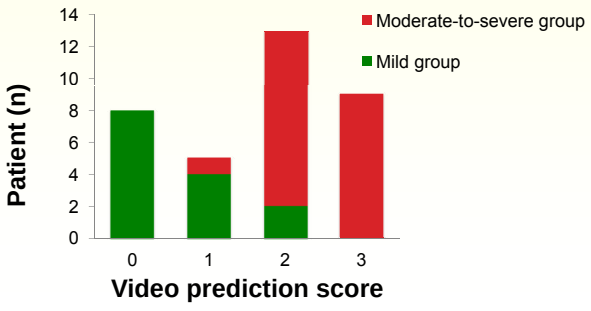
Video prediction score formulated by applying important diagnostic factors

Parameters		Scoring
1. Paradoxical chest movement	Yes	1
	No	0
2. Continuous snoring	Yes	1
	No	0
3. Subcostal retraction	Yes	1
	No	0
Total video score (Min 0, Max 3)		

Correlation between video prediction scores and AHI



Distribution of Video prediction score in moderate-to-severe group and mild group



Conclusions

- Home video clips are shown to be a promising screening method to predict moderate-to-severe OSA in children.
- Paradoxical chest movement, continuous snoring and subcostal retractions are the 3 most useful respiratory patterns observed on video clips.

Clinical application

- When total prediction score ≥ 2, the patient most likely has moderate-to-severe OSA
- That child should be urgently referred to sleep specialist

PAEDIATRIC RESPIRATORY REVIEWS (2003) 03(Suppl 2), S157–S159
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Paediatric Respiratory Reviews

Obstructive sleep apnea syndrome: the Asian perspective

Aroonwan Preutthipan

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In conclusion, childhood OSAS is not uncommon in Asia. Relatively less awareness of this disease among parents and primary physicians may lead to more severe complications in our children. It is hoped that in the future when OSAS attracts more public attention, the patients will be diagnosed and managed earlier and more appropriately.



Acknowledgement


Thank you