

Effect of otolaryngology residency program on confidence of obstructive sleep apnea managements

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Research

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Abstract

Background

According to the importance of obstructive sleep apnea syndrome managements by otolaryngologists, this study was designed to investigate knowledge, attitudes and practice of junior and senior residents of otolaryngology and evaluate the effect of current residency training program on choosing the first lines of treatment.

Methods

A total of 110 residents of otolaryngology were selected. Our study tools were obstructive sleep apnea knowledge and attitudes (OSAKA and OSAKA-KIDS) questionnaires. The participants were classified as junior and senior.

Results

Senior residents had significantly higher total knowledge score for OSAKA based on independent t test (12.73 VS 10.52). No significant difference was observed for OSAKA-KIDS (11.31 VS 10.69). Also, senior residents had significantly higher total attitude score (except management with CPAP) for OSAKA. The most frequent choice for the first line treatment was CPAP (63.8%) and weight loss (41.5%) among junior and senior residents, respectively.

Conclusions

Although the knowledge of otolaryngology residents increased during their program, the choice of first line treatment in obstructive sleep apnea was different between junior and senior residents. We found a need for further multidisciplinary education for residents especially in the management of sleep apnea particularly toward CPAP usage and this syndrome in pediatrics.

Introduction

Sleep disorders are common problems affecting quality of daily life. One of the categories of sleep disorders is respiratory problems. Obstructive sleep apnea-hypopnea syndrome is a common disorder associated with episodes of collapse of upper airway during sleep. Knowing obstructive sleep apnea is important because it has had an increasing incidence rate during recent years ¹. According to different cutoff points of apnea-hypopnea index (AHI), prevalence of obstructive sleep apnea will differ. It is estimated that about 2–4% of general population have this disorder. Prevalence of obstructive sleep apnea is increased along with increasing age and obesity in the world. Obstructive sleep apnea is an independent risk factor for cardiovascular diseases, depression, and diabetes with a great burden on

society². It has been observed that financial burdens had been decreased following to treatment of cases in surveillance of countries³.

Prevalence of obstructive sleep apnea in children is about 1.2–5.7%⁴. It has different etiology and complications in comparison to adult patients. The complications consist of growth disorders⁵, pulmonary hypertension and cor pulmonale, systemic hypertension⁶, neurocognitive and neurobehavioral complications⁷.

Most patients with obstructive sleep apnea remain undiagnosed which may be due to lack of knowledge of physicians⁸. According to the importance of management of obstructive sleep apnea by otolaryngologists, this study was designed to investigate knowledge and attitudes of Iranian resident physicians of otolaryngology about this disease by using obstructive sleep apnea knowledge and attitudes (OSAKA) obstructive sleep apnea knowledge and attitudes in children (OSAKA-KIDS) and questionnaire with descriptive and analytical approaches. In addition, we wished to evaluate the effect from number of residency years on choosing the lines of treatment in obstructive sleep apnea.

Materials And Methods

A total of 110 resident physicians of otolaryngology were selected for this questionnaire-based cross-sectional study. The participants were selected from junior and senior residents by convenient sampling from the participants of 16th International Congress of Iranian Society of Otorhinolaryngology, Head and Neck Surgery (ICIS-ORLHNS), 27–30 Nov 2018. The participants were classified as junior when they were in the first and second years and senior when they were beyond second year. A place was considered for completing the questionnaires and taking informed consent. Along with the main questionnaires another questionnaire was used for demographic information including years of residency, and their preferred first, second and third lines of treatment. Our sample size had 80% power to detect significant difference between two groups of junior and senior residents with incidence rates of 36% and 64% with 0.05 alpha errors.

Tools of study were OSAKA and OSAKA-KIDS questionnaires. OSAKA was developed by Schotland and Jeffe in 2003⁹, and OSAKA-KIDS was developed by Uong et al. in 2005¹⁰. Each of the above questionnaires has knowledge and attitude parts. The knowledge part of each questionnaire consists of 18 items with 3 choices of "true", "false" and "I don't know". The attitude part of these questionnaires has 5 items with 5-point Likert scale from "not important" to "extremely important" for 2 items and from "strongly disagree" to "strongly agree" for the other 3 items. The attitude part of the two questionnaires was same so our study had just one attitude part. At the end of the questionnaires, a question was added about choosing the first, second and third lines of treatment. There were 6 choices of weight loss, avoid supine position during sleep, nasal spray, surgery, CPAP and others. The questionnaires were translated to Persian language by 2 otolaryngologists who were expert in English language and validated by referring to 2 sleep medicine fellowships and 8 otolaryngology academic members who were expert in sleep apnea and English language, and they compared the translated questionnaires with their main versions. Finally,

all the authors approved representativeness of the questionnaires. Cronbach alpha was used for reliability of the questionnaires.

Giving correct answer by at least 50% of the junior residents and 70% of the senior residents was considered as acceptable percent for each question of OSAKA and OSAKA-KIDS.

The present study was approved by the ethics committee of Tehran University of Medical Sciences. All the participants gave us informed consent. For statistical analysis Pearson chi-square, independent samples t-test and Kruskal Wallis were used according to their indications using SPSS 24 (IBM, US). Two tailed p value 0.05 was considered as significance level.

Results

Among 110 resident physicians, 69 (62.8 %) residents were junior and 41 (37.2%) residents were senior. Fifty percent of junior residents and 51.2 % of senior residents were female. The mean age of junior residents was 28.7 years with standard deviation of 2.4 and the mean age of senior residents was 29 with standard deviation of 2.9 (table 1). Descriptive statistics was done for the individual questions of OSAKA (table 2) and OSAKA-KIDS (table 3). Cronbach alpha for junior and senior residents were 0.42 and 0.72, respectively for OSAKA, and 0.38 and 0.76, respectively for OSAKA-KIDS.

Knowledge part of OSAKA and OSAKA-KIDS

The questions with less than 50% correct answer among the juniors were "Uvulopalatopharyngoplasty is curative for majority of the patients" (40%), "treatment with continuous positive airway pressure (CPAP) can result in nasal congestion" (25%), "Alcohol at bedtime improves obstructive sleep apnea" (46%), "obstructive sleep apnea is more common in women than men" (27%), and "less than 5 apnea/hypopnea is normal in adults " (49%) in OSAKA, and "about 10% of children snore at a regular basis" (45%), "severity of snoring correlates with severity of obstructive sleep apnea in children" (32%), "children younger than 2 years should have polysomnography prior to obstructive sleep apnea surgery" (45%), and "cardiorespiratory monitor can reliably detect central and obstructive apnea in infants" (17%) in OSAKA-KIDS.

The questions with less than 70% correct answer among the seniors were "treatment with CPAP can result in nasal congestion" (34%), "The most common cause of obstructive sleep apnea in children is the presence of large tonsil and adenoid" (53%), "Alcohol at bedtime improves obstructive sleep apnea" (61%), "collar size 43 cm or more in men is associated with obstructive sleep apnea" (58%), "obstructive sleep apnea is more common in women than men" (56%), and "less than 5 apnea/hypopnea is normal in adults" (63%) in OSAKA, and "about 10% of children snore at a regular basis" (51%), "about 2% of children have obstructive sleep apnea" (49%), "Polysomnogram is needed to differentiate primary snoring from obstructive sleep apnea syndrome in children" (68%), "severity of snoring correlates with severity of obstructive sleep apnea in children" (61%), "excessive upper airway muscle tone loss during sleep contributes to obstructive sleep apnea in children" (58%), "snoring is most frequently reported at ages 2-8

years" (56%), "cardiac arrhythmia may be associated with untreated obstructive sleep apnea" (66%), "children with sickle cell disease are at increased risk of obstructive sleep apnea" (29%), "children younger than 2 years should have polysomnography prior to obstructive sleep apnea surgery" (34%), "significant OSA can occur without snoring in children" (63%), and " cardiorespiratory monitor can reliably detect central and obstructive apnea in infants" (44%) in OSAKA-KIDS.

Inferentially, significant difference was found between junior and senior residents in correct answering of the following questions based on Pearson chi-square test: For OSAKA, "uvulopharyngoplasty surgery is curable for most of the patients" ($P < 0.001$; better answer in the seniors), "overnight sleep study is the diagnostic gold standard of obstructive sleep apnea" ($P = 0.047$; better answer in the seniors), "loosing of tonicity of upper airway muscles during sleep helps formation of obstructive sleep apnea" ($P = 0.004$; better answer in the seniors), "enlarged palatine tonsil and enlarge adenoid are the most prevalent reasons of obstructive sleep apnea in children" ($P = 0.032$; better answer in the seniors), "examination of pharynx, facial bones and cranial bones is useful in a patient suspected to obstructive sleep apnea", ($P = 0.032$; better answer in the seniors), "lack of treatment of obstructive sleep apnea is associated with increased driving accidents" ($P = 0.008$; better answer in the seniors), and "obstructive sleep apnea is more common in women than men" ($P = 0.003$; better answer in the seniors) (table 2); for OSAKA-KIDS, "about 2% of children have obstructive sleep apnea" ($P = 0.018$; better answer in the juniors), "severity of snoring is correlated with severity of obstructive sleep apnea in children" ($P = 0.003$; better answer in the seniors), "children with sickle cell anemia have more risk of obstructive sleep apnea" ($P = 0.028$; better answer in the juniors), and "cardiopulmonary monitoring can confidently detect central and obstructive apnea in infants" ($P = 0.003$; better answer in the seniors) (table 3).

Attitude part of OSAKA and OSAKA-KIDS

In the following cases, for OSAKA, attitude of the juniors and the seniors were different based on Pearson chi-square test in 2 by 5 tables: "obstructive sleep apnea from the viewpoint of a clinical disease" ($P = 0.004$), "Identifying patients with possible obstructive sleep apnea" ($P = 0.002$), "I have enough self-confidence to find a patient who is at risk of obstructive sleep apnea" ($P = 0.001$), and "I have enough ability to be involved with patients with obstructive sleep apnea" ($P = 0.003$). No significant difference was observed for "I have enough ability to treat the patients with CPAP" ($P = 0.290$). In the following cases, for OSAKA-KIDS, attitude of the juniors and the seniors were different based on Pearson chi-square test in 2 by 5 tables: "obstructive sleep apnea from the viewpoint of a clinical disease" ($P = 0.002$), "finding the diseases resulting in obstructive sleep apnea" ($P = 0.002$), "I have enough self-confidence to find a patient who is at risk of obstructive sleep apnea" ($P = 0.003$), and "I have enough ability to be involved with patients with obstructive sleep apnea" ($P = 0.002$). No significant difference was observed for "I have enough ability to treat the patients with CPAP" ($P = 0.051$) (table 4).

Total score of knowledge and its association with attitude

Total score of knowledge was compared between the juniors and the seniors. Senior residents had significantly higher total knowledge score for OSAKA based on independent t test (12.73 ± 3.13 VS

10.52±2.63; P <0.001) (table 2). No significant difference was observed for OSAKA-KIDS (11.31±3.59 VS 10.69±2.49; P =0.288) (table 3). Association of total score of knowledge with attitude status was analyzed using Kruskal Wallis test. According to this, for OSAKA, total knowledge score was associated with attitude from the viewpoint of clinical importance of sleep apnea in both junior (P =0.025) and senior (P =0.003) residents, total knowledge score was associated with attitude from the viewpoint of clinical importance of finding patients with obstructive sleep apnea in both junior (P =0.006) and senior (P =0.034) residents, total knowledge score was associated with self-attitude to ability of finding patients with obstructive sleep apnea in both junior (P <0.001) and senior (P =0.001) residents, total knowledge score was associated with self-attitude to ability to be involved with patients with obstructive sleep apnea in junior (P =0.028) residents however not in the seniors (P =0.052), and no significant association was observed for self-attitude to ability to treat the patients with CPAP in junior (P =0.141) and senior (P =0.139) residents. For OSAKA-KIDS, total knowledge score was associated with attitude from the viewpoint of clinical importance of sleep apnea in senior (P =0.029) but not in junior (P =0.290) residents, total knowledge score was associated with attitude from the viewpoint of clinical importance of finding patients with obstructive sleep apnea in senior (P =0.013) but not in junior (P =0.216) residents, no significant association was observed for self-attitude to ability of finding patients with obstructive sleep apnea in junior (P =0.081) and in senior (P =0.392) residents, no significant association was observed for self-attitude to ability to be involved with patients with obstructive sleep apnea in junior (P =0.117) and in senior (P =0.478) residents, and no significant association was observed for self-attitude to ability to treat the patients with CPAP in junior (P =0.495) and senior (P =0.838) residents.

Correlation of total knowledge score in OSAKA with total knowledge score in OSAKA-KIDS was determined in junior and senior residents. According to this, positive correlation was found for both junior and senior residents (P <0.001).

Choosing the first lines of treatment

Effect of being junior or senior on choosing the first lines of treatment was analyzed using Pearson chi-square. According to this, significant association was found for first (P =0.006) and third lines (P =0.014) however not in second line (P =0.274). The most frequent choice for the first line was CPAP (63.8%) and weight loss (41.5%) among junior and senior residents, respectively. The most frequent choice for the third line was weight loss (29.0%) and surgery (22.0%) among junior and senior residents, respectively.

Discussion

Current study indicated scientific needs of junior and senior residents. According to this, the needs of junior residents were information about CPAP, knowing risk factors of obstructive sleep apnea, knowing the role of surgery and knowing parameters of polysomnography. The needs of senior residents were epidemiological information, information about CPAP, knowing risk factors of obstructive sleep apnea and knowing the results of polysomnography. The inferential results showed that senior residents had significantly better answering for 7 questions of OSAKA and 2 questions of OSAKA-KIDS. Junior residents

had significantly better answering only for 2 questions of OSAKA-KIDS. These questions were about prevalence of obstructive sleep apnea in children and role of sickle cell anemia. The low prevalence of sickle cell anemia across Iran may be the cause this result although there are some providences in Iran which has high rate for sickle cell anemia as 1.3% of population ¹¹. This knowledge is so important of otolaryngologist surgeons as the crisis would be occurred in operation room ¹². This study showed that during residency training the residents would find the results which can be get from surgery and importance of preoperative results would have effect on the results of surgery. The inferential results of the attitude part in both OSAKA and OSAKA-KIDS showed that attitude was different between junior and senior residents and could affect their knowledge, except the attitude item about using CPAP. The same attitude about the CPAP therapy would be root from lack of proper education about CPAP device during otolaryngology. This result confirmed more junior residents would choose CPAP than senior residents. Choosing first and third lines of treatment was different between junior and seniors. CPAP was the first line of treatment from the viewpoint of the juniors whereas weight loss was the first line of treatment from the view point of the seniors. Total score of knowledge was not significantly different between junior and senior residents in OSAKA-KIDS. In other words, it was so important to put more emphasis on management of children sleep apnea management as the role of otolaryngologist would be more important because the role of CPAP therapy may be lower in this population. Total knowledge score in OSAKA and OSAKA-KIDS had positive correlation in both junior and senior residents.

Schotland and Jeffe (2003) developed OSAKA questionnaire based on data from 115 physicians. The mean of total knowledge score was 13.3 ± 2.8 out of 18. No significant difference was found between genders. The 5 attitude items were correlated with each other. Age was negatively correlated with knowledge and 1 item of attitude which was about self-confidence to manage patients with obstructive sleep apnea. Cronbach alpha for the knowledge part was 0.76 ⁹. By comparison our results with those we can conclude the Iranian physician knowledge about sleep apnea should be reinforced. Uong et al. (2005) in a study in which developed OSAKA-KIDS questionnaire considering this rationale that lack of treatment of obstructive sleep apnea results in serious complications. This questionnaire was mailed to 1195 physicians. All the items had more than 50% correct answering except the question about the role of sickle cell disease with 14.5% correct answering ¹⁰. In our study, this question senior residents had significantly lower correct answering (29.3%) compared with junior residents (50.7%) as their medical knowledge about this disease may be decreased during residency due to recede from internal medicine education.

Ojeda et al. (2013) performed a study on Latin American primary care physicians using Spanish version of OSAKA. A number of 367 physician responded the questionnaire with total knowledge score 60%. The least correct answering was for the question about association of cardiac arrhythmia with untreated obstructive sleep apnea (18.5%) ¹³. In another report of this work, Ojeda et al. (2018) compared recent graduates with practicing physicians. Practicing physicians showed better total knowledge score ¹⁴. Ozoh et al. (2015) in Nigeria, performed a study on 143 graduating medical students using OSAKA. Total knowledge and total attitude score showed a significant positive correlation. In the attitude part, over 80%

of the participants considered obstructive sleep apnea as an important disorder¹⁵. Williams et al. (2015) investigated referral rate of physicians and its association with knowledge and attitude. Total referral rate was 75%; however, it was not influenced by knowledge and attitude of physicians. Patients inquiring about obstructive sleep apnea significantly increased referral rate with adjusted odds ratio 9.38¹⁶. Li et al. (2016) in China, studied 560 physicians using OSAKA and their viewpoints on treatment lines. Total knowledge score was 44.87%. The participants ranked treatment lines as weight loss, quit smoking and alcohol, CPAP, avoid fatigue, surgery and drugs. The mentioned lines were different from the lines of our study¹⁷. Corso et al. (2017) in Italy, studied knowledge and attitude of 370 anesthetists using OSAKA. Total knowledge score was 11.8 in which anesthetists with more than 15 years of experience showed better score compared with anesthesiology residents¹⁸. Goyal et al. (2018) in India, studied 232 final-year medical students using OSAKA and OSAKA-KIDS. Total knowledge score was 37.9% and 42.1% for OSAKA and OSAKA-KIDS, respectively. They found that there was not enough knowledge in spite of enough attitude and thinking about the importance of the disorder¹⁹. Jokubauskas et al. (2018) in a nation-wide study in Lithuania, studied knowledge and attitude of 353 dentists using OSAKA. Increased years of experience was significantly associated with less knowledge. There was no significant difference between general dentists and specialists²⁰. Canadian residents of otolaryngology were evaluated by OSAKA in 2020. The total score of knowledge was 88.9% and in the attitude part they had greatest problem with CPAP and just 15.2% were confident with in managing CPAP. The senior residents had better knowledge scores and had better confident towards identifying patients at risk for obstructive sleep apnea, ability to manage these patients and even management of patient with CPAP²¹.

Knowledge and insights of physicians about common medical conditions is very important to increase level of public health²². Educations should be presented for medical students as well as graduated physicians including residents and specialists. It has been shown that education of the targeted population results in better public health and reduction of burdens^{23,24}. The case obstructive sleep apnea is not an exception and the positive results of education has been investigated²⁵. This is first study which analyzed the otolaryngology education program on knowledge and attitude toward obstructive sleep apnea.

From the limitations of our study, selection bias of the participants in the congress can be pointed out. Voluntary participation helped us to achieve more reliable and patiently answering, however might be resulted in participation of the residents with more interest in research and in the topic. Regarding previous literature, we had some strengths such as simultaneous investigation of OSAKA and OSAKA-KIDS and choosing treatment lines from the view point of otolaryngology residents. Otolaryngology specialists, fellowships, fellows and residents are very important targeted group in this topic.

Conclusion

Knowledge and attitudes about obstructive sleep apnea were different between junior and senior residents. Therefore, resident physicians of otolaryngology need further education. According to the

literature knowledge of different specialties were different; in some specialties higher practical experience was associated with better knowledge and in some other groups it was vice versa. Quasi experimental studies are suggested to investigate the outcomes of education on patient management and prevention adverse effect of obstructive sleep apnea.

Practice implications: Otolaryngologists should be aware of obstructive sleep apnea to manage such patients. Therefore, they should be educated and educate the patient.

Abbreviations

Apnea-hypopnea index (AHI), obstructive sleep apnea knowledge and attitudes (OSAKA), obstructive sleep apnea knowledge and attitudes in children (OSAKA-KIDS), continuous positive airway pressure (CPAP), obstructive sleep apnea (OSA)

Declarations

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Conflicts of interest

The authors declare no conflict interest. The project was performed voluntary.

Financial disclosures

None

Availability of data and materials

Not applicable

Consent for publication

Not applicable

Ethics approval and consent to participate

The present study was approved by the ethics committee of Tehran University of Medical Sciences. All the participants gave us informed consent.

Authors' contributions

KSH, AN and SAYA, evaluated, provided and helped for completing the questionnaires. FH and SS wrote the original draft. RE did the final editing and was responsible for the resources. All authors read and approved the final manuscript.

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Tables

Table 1: demographic data for 110 participant residents

		Junior residents	Senior residents
Numbers (percentage)		69 (63 %)	41 (37%)
Gender (numbers)	Male	34	20
	Female	35	21
Age* (standard deviation)		28.7 (2.4)	29 (2.9)

*year

Table 2: Data from the knowledge part of OSAKA questionnaire.

Question (answer)	Correct answering in		P value
	Juniors Frequency (%)	Seniors Frequency (%)	
Women with OSA may present with fatigue alone (T)	60 (87.0)	33 (80.5)	0.364
Uvulopalatopharyngoplasty is curative for majority patients with OSA (F)	28 (40.6)	31 (75.6)	<0.001*
The estimated prevalence of OSA among adults is between 2% and 10% (T)	39 (56.5)	20 (48.8)	0.431
The majority of patients with OSA snore (T)	47 (68.1)	29 (70.7)	0.774
OSA is associated with hypertension (T)	56 (81.2)	33 (80.5)	0.931
Overnight sleep study is the gold standard for diagnosing OSA (T)	54 (78.3)	38 (92.7)	0.048*
Treatment with CPAP can result in nasal congestion (F)	17 (24.6)	14 (34.1)	0.284
Uvula-assisted uvuloplasty is an appropriate treatment for severe OSA (F)	36 (52.2)	22 (53.7)	0.880
Loss of upper airway muscle tone during sleep contributes to OSA (T)	45 (65.2)	37 (90.2)	0.004*
The most common cause of OSA in children is the presence of large tonsil and adenoid (T)	40 (58.0)	32 (78.0)	0.032*
Antiofacial and oropharyngeal examination are useful in a patient with suspected OSA (T)	44 (63.8)	34 (82.9)	0.032*
Alcohol at bedtime improves OSA (F)	32 (46.4)	25 (61.0)	0.138

untreated OSA is associated with higher incidence of automobile crashes (T)	47 (68.1)	37 (90.2)	0.008*
Wearing a collar size 43 cm or greater is associated with OSA (T)	35 (50.7)	24 (58.5)	0.427
OSA is more common in women than men (F)	19 (27.5)	23 (56.1)	0.003*
CPAP is the first therapy for severe OSA (T)	49 (71.0)	33 (80.5)	0.270
Less than 5 apnea/hypopnea per hour is normal in children (T)	34 (49.3)	26 (63.4)	0.150
Cardiac arrhythmia may be associated with OSA (T)	44 (63.8)	31 (75.6)	0.197
OSA is more common in children than adults (T)	69 (100)	40 (100)	
Mean knowledge score (out of 18)	10.52	12.73	<0.001**

OSA: obstructive sleep apnea; T: true; F: false. * Significant at P <0.05 according to Pearson chi-square. ** Significant at P <0.05 according to independent t test.

Table3: Data from the knowledge part of OSAKA-KIDS questionnaire.

Question (answer)	Correct answering in		P value
	Juniors Frequency (%)	Seniors Frequency (%)	
Children with OSA may present with hyper activity (T)	50 (72.5)	29 (70.7)	0.845
50% of children snore on a regular basis (T)	31(44.9)	21 (51.2)	0.523
50% of children have OSA (T)	43 (62.3)	16 (39.0)	0.018*
OSA in children may be associated with pulmonary hypertension (T)	45 (65.2)	32 (78.0)	0.156
Polysomnogram is needed to differentiate primary snoring from obstructive sleep apnea syndrome in children (T)	46 (66.7)	28 (68.3)	0.860
Duration of snoring correlates with severity of OSA in children (F)	22 (31.9)	25 (61.0)	0.003*
Decrease in upper airway muscle tone during sleep contributes to OSA in children (T)	46 (66.7)	24 (58.5)	0.391
Enlarged tonsils and adenoids are the most frequent contributing factors to OSA (T)	50 (72.5)	36 (87.8)	0.060
Children with suspected OSA should have a thorough head and neck and pharyngeal examination (T)	57 (82.6)	33 (80.5)	0.780
Children with untreated OSA may be affected by learning disorders (T)	49 (71.0)	35 (85.4)	0.087
OSA is most frequently reported at ages 2-8 years (T)	45 (65.2)	23 (56.1)	0.341
Arrhythmia may be associated with untreated OSA (T)	42 (60.9)	27 (65.9)	0.601
Children with sickle cell disease are at increased risk for OSA (T)	35 (50.7)	12 (29.3)	0.028*
Children younger than 2 years should have polysomnogram prior to intervention for presumed OSA (T)	31 (44.9)	14 (34.1)	0.266
Isolated OSA can occur without snoring in children (T)	45 (65.2)	26 (63.4)	0.848
Failure to thrive is a frequent complication of OSA (T)	46 (66.7)	33 (80.5)	0.119
Children with severe OSA may have transient worsening of behavioral symptoms after adenotonsillectomy (T)	43 (62.3)	32 (78.0)	0.087
Respiratory monitor can reliably detect both central and obstructive sleep apnea (T)	12 (17.4)	18 (43.9)	0.003*

ive apnea in infants (F)			
	69 (100)	40 (100)	
ore (out of 18)	10.69	11.31	0.288#

OSA: obstructive sleep apnea; T: true; F: false. * Significant at $P < 0.05$ according to Pearson chi-square. # Non-significant according to independent t test.

Table 4: Descriptive data from the attitude part of OSAKA questionnaire.

Question	Attitude category	Residents		P value
		Juniors Frequency (%)	Seniors Frequency (%)	
Obstructive sleep apnea from the viewpoint of a clinical disease	Not important	0 (0.0)	1 (2.4)	0.004*
	Somewhat important	2 (2.9)	1 (2.4)	
	Important	44 (63.8)	12 (29.3)	
	Very important	17 (24.6)	14 (34.1)	
	Extremely important	6 (8.7)	12 (29.3)	
	Sum	69 (100)	40 (100)	
Identifying patients with possible obstructive sleep apnea	Not important	0 (0.0)	1 (2.4)	0.002*
	Somewhat important	4 (5.8)	1 (2.4)	
	Important	50 (72.5)	15 (36.6)	
	Very important	11 (15.9)	14 (34.1)	
	Extremely important	4 (5.8)	9 (22.0)	
	Sum	69 (100)	40 (100)	
I have enough self-confidence to find a patient who is at risk of obstructive sleep apnea	Strongly disagree	7 (10.1)	3 (7.3)	0.001*
	Disagree	41 (59.4)	9 (22.0)	
	Neither agree nor disagree	7 (10.1)	6 (14.6)	
	Agree	12 (17.4)	16 (39.0)	
	Strongly agree	2 (2.9)	6 (14.6)	
	Sum	69 (100)	40 (100)	
I have enough ability to be involved with patients	Strongly	6 (8.7)	2 (4.9)	0.003*

with obstructive sleep apnea	disagree			
	Disagree	40 (58.0)	11 (26.8)	
	Neither agree nor disagree	13 (18.8)	9 (22.0)	
	Agree	8 (11.6)	11 (26.8)	
	Strongly agree	2 (2.9)	7 (17.1)	
	Sum	69 (100)	40 (100)	
I have enough ability to treat the patients with CPAP	Strongly disagree	12 (17.4)	6 (14.6)	0.290
	Disagree	28 (40.6)	15 (36.6)	
	Neither agree nor disagree	23 (33.3)	10 (24.4)	
	Agree	6 (8.7)	8 (19.5)	
	Strongly agree	0 (0.0)	1 (2.4)	
	Sum	69 (100)	40 (100)	

* Significant difference in junior and senior residents at $P < 0.05$ according to Pearson chi-square in 2 by 5 tables.