

# Ear, nose and throat specialists' awareness on oral and dental health and orthodontic problems in children with mouth breathing due to adenotonsillar hypertrophy

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**Cite this article as:** Arat Maden E. Ear, nose and throat specialists' awareness on oral and dental health and orthodontic problems in children with mouth breathing due to adenotonsillar hypertrophy. J Health Sci Med 2022; 5(4): 977-983.

## ABSTRACT

**Introduction:** Considering the nature of oral healthcare needs for children with adenotonsillar hypertrophy (ATH) and mouth breathing and the increased risk of oral disease faced by the children, we aimed ascertain the perception and experience of ear, nose and throat (ENT) specialists to dental referral for such children.

**Material and Method:** A descriptive, cross-sectional survey was sent to a sample of ENT specialists in Turkey. The questionnaire, consisted of 27 questions in five domains. A total of 123 ENT specialists participated in the survey.

**Results:** In the evaluation of the examination of the oral cavity of children with ATH, a low frequency of examination for the malocclusion (57.7%) and oral functional habits (68.3%) was found. Reasons ENT specialists referred patients to orthodontists varied from missing teeth 15.4% to sounds from tmj 66.7%. In the chi-square test for the effect of gender and the location of practice in the orthodontic referral of ENT specialists we could identify significant predictors ( $p < 0.05$ ).

**Conclusion:** Although the majority were aware that ENT specialists has an important role in the prevention of parafunctional oral habits and orthodontic anomalies, they did not have the pertinent knowledge and practice to apply a complete and systematic examination for oral and dental health, parafunctional oral habits and malocclusion.

**Keywords:** ATH, ENT specialists, malocclusion, oral and dental health, referral

## INTRODUCTION

ATH has been reported as the most important factor causing partial or complete obstruction of the upper respiratory tract in childhood (1). In general, it has been observed most frequently and severely between the ages of 4 and 8 years (2). Adenotonsillar hypertrophy can affect children in many ways, causing craniofacial changes such as maxillary growth retardation, mandibular retrusion, crossbite, dolichocephalic face, as well as myofunctional changes such as chewing, swallowing and speech disorders (3,4). Additionally, adenoid and tonsil hypertrophy is the most important factor of mouth breathing in pediatric patients (5). Mouth breathing due to ATH has been shown to cause "Adenoid face" that defined most dentofacial changes such as V-shaped narrowing of the maxillary arch, opening of the lips and lowering of the tongue, retrognathic mandible, increased overjet, anterior and posterior crossbite, anterior open bite, and displacement of the contact points (6,7).

Therefore, it is necessary to intervene these etiological factors early to prevent the development or worsening of the malocclusion and if it has already developed, correct it with early orthodontic treatment to stimulate eugenic skeletal growth (8). Also, regarding oral health problems, mouth breathing can increase the risk of dry mouth, tooth decay and gingivitis due to evaporation of saliva. Some authors reported that significantly higher number of initial lesions in all teeth was observed in the mouth breather children (9,10). A multi-disciplinary management approach involving general and pediatric dentists, otolaryngologists and orthodontists is essential for the early diagnosis and treatment of oral health problems in mouth breathing children (1).

Dentofacial appearance has a significant impact on individuals, especially children (11,12). Shaw et al. (13) reported that children were teased about their dentition more than any other factors. Malocclusion may therefore

affect the individual's quality of life and self-esteem. Early intervention and preventive orthodontics perform the same functions and prevent or reduce progression to fully developed malocclusion later in life and also remove factors that hinder the regular development of dental arches (14). Furthermore, early orthodontic treatment has been found to improve both psychosocial development and masticatory function in children. The referral is also important for planning the individual remineralization therapy and to prevent the progression of the caries lesions. (1). Thus, a referral may significantly and positively change an individual's life.

ENT specialists may help in early diagnosis of orthodontic problems and other oral and dental health problems in children with mouth breathing due to ATH and this may advance the treatment effect and its constancy over the years. In these children, early detection of caries is the basic principle in order to reduce the loss of tooth structure and to establish an appropriate treatment plan (15). To the best of our knowledge, there is no study published worldwide focusing on the assessment of awareness of ENT specialists regarding oral and dental health and orthodontic problems in children with mouth breathing due to ATH.

This study aimed to determine the knowledge, attitudes and practices of ENT specialists who work in Turkey, concerning the prevention of oral and dental health problems and malocclusion and to raise awareness about the importance of ENT specialists in preventing oral and dental health and orthodontic problems in mouth breathing children due to ATH.

## MATERIAL AND METHOD

A descriptive cross-sectional study was carried out among ENT specialists including those with post-graduation levels, working in government, private, and other healthcare sectors who are currently practicing in Turkey. Ethical permission required for the study to be carried out was obtained from Gaziosmanpaşa Training and Research Hospital, Medical Researches Ethics Committee (Date: 28.04.2021, Decision No: 268). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The instrument for the study was a self-made comprehensive questionnaire that consists of five chapters containing questions about the sociodemographic information of the participants, the risk factors of malocclusion and oral and dental health, the evaluation of the attitudes of ENT specialists towards the prevention of malocclusions, parafunctional habits and dental and gingival diseases, the evaluation of the behaviors

of ENT specialists on the examination and treatment of malocclusion, parafunctional habits and dental and gingival diseases, and the evaluation of knowledge levels and sources of information on malocclusion and oral and dental health of ENT specialists. The first section of questionnaire included sociodemographic data such as age, gender, title, years of clinical experience, hours of patient care per week, and the number of patients with ATH seen per month and the number of operation of ATH per month. The second part included questions measuring the level of knowledge of ENT specialists about risk factors related to malocclusion and oral and dental health. In the third and fourth sections, physicians were asked about the attitudes and practices regarding the prevention of malocclusion and dental and gingival diseases and orthodontic examination practices (knowledge about orthodontic problems, whether they have performed oral and dental examinations); and in the fifth part, it was questioned if ENT specialists received training on dental and gingival diseases and orthodontic problems and prevention of these and the source of their knowledge.

The questionnaires were combined into a form on Google forms and sent to the participants via e-mail, WhatsApp, and private social network platforms starting April 28, 2021, and the questionnaires were closed on May 28, 2021. Before starting the study, to test the comprehensibility and consistency of the questionnaire within the scope of the study, the questions were sent to 5 experts, 2 pediatric dentists, 2 ENT specialist, and 1 biostatistician. Therefore, biased and confusing questions were omitted. A pilot study was conducted before the questionnaires were uploaded online to assess the relevance and intelligibility of the questions. The pilot study sample included participants representing nine ENT specialists, and each received a hard copy of the questionnaire. A brief introduction was presented at the beginning of the survey to inform the respondents of the purpose and content of this study, and electronic informed consent was obtained if they agreed to complete the questionnaire. In the OpenEpi power analysis program, with an estimated margin of error is 5% and sample power is 80%, the required minimum number of responders is estimated to be 120. A total of 123 Turkish ENT specialists, all volunteers, answered the questionnaire.

## Statistical Analyses

Statistical analyses were performed using Statistical Package for the Social Sciences 20.0 (SPSS 20.0) program. The demographic characteristics of the participants were evaluated with the Chi-square test. The Shapiro-Wilk test was used to analyze the assumptions of normal distribution of the quantitative results. A p value less than 0.05 was considered as 'statistically significant'.

## RESULTS

A-hundred twenty three ENT specialists completed the questionnaires. Among the responding ENT specialists, 64.2% were male while 35.8% were female. Their location of practice varied between governmental hospitals (38.2%), academic institutions (50.4%) and private clinics (9.8%). According to the duration of practice, 27.6% reported experience of more than 20 years. Many reported working duration up to 40 hours a week (75.6%). Ratio of eleven or more patients admitted within a month due to ATH were 52%. Various sociodemographic details of the study participants are available in **Table 1**.

Table 1. Socio-demographic characteristics of respondents		
	(n=123)	(%)
<b>Gender</b>		
Male	79	64.2
Female	44	35.8
<b>Age</b>		
20-29	43	35.0
30-39	34	27.6
40-49	27	22.0
50-59	14	11.4
>=60	5	4.1
<b>Location of practice</b>		
Governmental hospital	47	38.2
University	62	50.4
Private hospital	12	9.8
Don't work	2	1.6
<b>Years at work</b>		
0-9	59	48.0
10-19	30	24.4
>=20	34	27.6
<b>Hours per week</b>		
31-40	30	24.4
>=40	93	75.6
<b>Patients per day</b>		
0-10	5	4.1
11-20	10	8.1
21-30	19	15.4
>30	89	72.4
<b>Patients with ATH per month</b>		
0-5	32	26.0
6-10	27	22.0
>=11	64	52.0
<b>ATH operation per month</b>		
0-5	48	39.0
6-10	42	34.1
>=11	33	26.8

ATH: Adenotonsillar hypertrophy

Of the total sampling, 95.9% knew that ATH is a risk factor for malocclusion. More than half of the sample, 79.7% had sufficient knowledge regarding that decreasing savigation in children with mouth respiratory and ATH promotes an aciduric and acidogenic microflora. Regarding ENT

specialists' knowledge levels about various orthodontic problems, knowledge of retrognathism was the most (92.7%), while knowledge of overbite was the least (50.4%) (**Table 2**).

Table 2. ENT specialists' knowledge levels about orthodontic problems and risk factors of malocclusion and oral and dental health in children with ATH			
Knowledge levels		n=123 (%)	
1. Children with ATH are more likely to develop malocclusion. Do you have any information about this?	Yes	118	95.9
	No	5	4.1
2. Since the decrease in the amount of saliva in children with ATH will reduce the mechanical clearance of saliva, it may cause the accumulation of food residues and dental plaque, leading to an aciduric and acidogenic oral microflora, which leads to the development of caries and bad breath. Do you have any information about this?	Yes	98	79.7
	No	25	20.3
<b>Orthodontic problems</b>			
		n=123	(%)
<b>Crowding</b>			
I know		92	74.8
I don't know		31	25.2
<b>Crossbite</b>			
I know		76	61.8
I don't know		47	38.2
<b>Overbite</b>			
I know		62	50.4
I don't know		61	49.6
<b>Anterior openbite</b>			
I know		89	72.4
I don't know		34	27.6
<b>Prognathism</b>			
I know		105	85.4
I don't know		18	14.6
<b>Retrognathism</b>			
I know		114	92.7
I don't know		9	7.3
<b>Missing teeth</b>			
I know		78	63.4
I don't know		45	36.6
<b>Spaces</b>			
I know		89	72.4
I don't know		34	27.6
<b>None</b>			
I know		5	4.1
I don't know		118	95.9

\* Participants marked more than one option.

A total of 95.1% believed that they played important roles in preventing malocclusion, dental caries and gingival diseases in children. Also, 95.1% considered dental visits for preventing malocclusion and dental and gingival diseases. About the fact that ENT specialists have to examine children's teeth and oral cavities, 95.9% of the participants responded positively (**Table 3**).

**Table 3. Questions related to attitude domain among the ENT specialist**

		(n=123)	(%)
1. ENT specialists have to examine oral cavity of children with ATH.	Yes	118	95.9
	No	-	-
	I don't know	5	4.1
2. Dental examination is important in the prevention of malocclusion and dental and oral diseases.	Yes	117	95.1
	No	2	1.6
	I don't know	4	3.3
3. ENT specialists play an important role in the prevention of malocclusion and oral and dental diseases in children with ATH.	Yes	117	95.1
	No	2	1.6
	I don't know	4	3.3
4. A multidisciplinary approach management that includes pediatric dentists, ENT specialists and orthodontists is important for the early diagnosis and treatment of oral health problems in children with ATH.	Yes	118	95.9
	No	-	-
	I don't know	5	4.1

\* ENT: Ear, Nose, Throat ATH: Adenotonsillar hypertrophy

They were also asked if they evaluated the oral functional habits of their patients. While 21.1% of the sample indicated that they evaluated when the patient had a complaint about this subject, 68.3% of the sample indicated that they evaluated every time. 57.7% of the participants reported performing routine oral examinations. Participants were asked if they would refer children to the dental practitioner when they decided to adenotonsillectomy. 84.6% indicated that they would refer.

Moreover, participants were asked if they would refer a child with ATH to dentists when they identified a child with malocclusion or any parafunctional habits. Most of the sample (85.4%) indicated that they would refer (Table 4). On the other hand participants were asked if they had any patient that they referred to orthodontist or dental practitioner. 57.7% indicated that they had orthodontic referral 30.9% indicated that they referred children to dental practitioner (Table 4).

Their answers for the reasons for referral due to orthodontic and dental problems to orthodontist or dental practitioner differed for each condition from 15.4% for missing teeth to 66.7% for temporomandibular diseases (Table 5).

The participants preferred several methods to receive dental education and training on parafunctional oral habits and orthodontic anomalies. Scientific journals and colleagues were the most preferred method, (40.7%; 44.7%). Furthermore, previous dental training about orthodontic problems in children was reported by only 17.8% of participants. On the other hand, their responses for receiving dental education regarding oral and dental diseases and protective measures in children during their medical or specialty training were mostly "I did not receive any dental education and training" (82.9%). Most of the participants (86.2%), indicated that they needed more knowledge about oral and dental diseases and prevention of malocclusion.

**Table 4. Questions related to practice domain among ENT specialists**

		(n=123)	(%)
1. Do you evaluate the oral functional habits of your patients with ATH?	Yes	84	68.3
	No	13	10.6
	If any problem	26	21.1
2. Do you perform oral health examinations for malocclusion for your patients with ATH?	Yes	71	57.7
	No	10	8.1
	If any problem	42	34.1
3. Do you refer your patient with ATH that you decide to make adenotonsillectomy to a dentist when you diagnose dental caries or any gingival problems?	Yes	104	84.6
	No	19	15.4
4. Do you refer your patient with ATH to a dentist when you diagnose malocclusion or any parafunctional oral habit?	Yes	105	85.4
	No	18	14.6
5. Did you have any patient with ATH that need oral appliance for treatment of obstructive sleep apnea (OSA), you consult with dentistry?	Yes	41	33.3
	No	54	43.9
	I think this appliance is not successful for OSA	8	6.5
	I don't know this appliance	19	15.4
6. Did you have any patient you consult with orthodontics?	No response	1	0.8
	Yes	71	57.7
	No	49	39.8
7. Did you have any patient you consult with dentistry?	No response	3	2.4
	Yes	38	30.9
	No	82	66.7
	No response	3	2.4

\* ATH: Adenotonsillar hypertrophy

**Table 5.** Responses of ENT specialists in relation to the reason for orthodontic referral

	(n=123)	(%)
Sounds from tmj		
Yes	82	66.7
No	41	33.3
Jaw deviation		
Yes	80	65.0
No	43	35.0
Retrognathism		
Yes	75	61.0
No	48	39.0
Prognathism		
Yes	73	59.3
No	50	40.7
Crowding		
Yes	72	58.5
No	51	41.5
Grinding at sleep		
Yes	65	52.8
No	58	47.2
Early tooth loss		
Yes	51	41.5
No	72	58.5
Crossbite		
Yes	47	38.2
No	76	61.8
Difficulty in biting		
Yes	43	35.0
No	80	65.0
Overbite		
Yes	36	29.3
No	87	70.7
Spaces		
Yes	36	29.3
No	87	70.7
Mouth breathing/snoring		
Yes	25	20.3
No	98	79.7
Delayed eruption		
Yes	23	18.7
No	100	81.3
Missing teeth		
Yes	19	15.4
No	104	84.6
None		
Yes	5	4.1
No	118	95.9

ENT: Ear, Nose, Throat tmj: temporomandibular joint, \*Participants marked more than one option.

We examined the referral patterns of ENT specialists to orthodontists and dentists regarding demographic characteristics such as gender, location of practice, years at work and seen patients with ATH per month. In the chi-square test, there was a statistically significant result for the effect of gender and the location of practice. Orthodontic referral of male participants (70.9%) were statistically higher than female participants (34.1%). Orthodontic referral of ENT specialists working in governmental hospital (48.9%) were statistically lower than ENT specialists working in private hospital (66.%) (Table 6). There wasn't any statistically significant dental referral result for the effect of demographic characteristics (Table 6).

**Table 6.** The effect of some sociodemographic factors on orthodontic referrals of ENT specialists

	Referrals			Statistical analysis*
	n/ %	n/ %	n/ %	
Gender				
Male	56 (70.9)	20 (25.3)	3 (3.8)	$\chi^2=19.988$ df=2, p <.001
Female	15 (34.1)	29 (65.9)	0 (.0)	
Location of practice				
Governmental hospital	23 (48.9)	24 (51.1)	0 (.0)	$\chi^2=16.897$ df=6, p <.010
University	38 (61.3)	23 (37.1)	1 (1.6)	
Private hospital	8 (66.7)	2 (16.7)	2 (16.7)	
Don't work	2 (100.0)	0 (.0)	0 (.0)	
Years at work				
0-9	29 (49.2)	29 (49.2)	1 (1.7)	$\chi^2=6.899$ df=4, p >.05
10-19	19 (63.3)	11 (36.7)	0 (.0)	
>=20	23 (67.6)	9 (26.5)	2 (5.9)	
Patients with ATH per month				
0-5	18 (56.3)	14 (43.8)	0 (.0)	$\chi^2=7.662$ df=4, p >.05
6-10	11 (40.7)	14 (51.9)	2 (7.4)	
>=11	42 (65.6)	21 (32.8)	1 (1.6)	

\*p<.05,  $\chi^2$ =chi-square value, df= degrees of freedom

## DISCUSSION

According to the American Academy of Pediatric Dentistry and the American Academy of Pediatrics (16, 17), dental visits for children should begin at 6-12 months of age. This early visit to the dentist and routine oral examination is even more important for the child with a background medical problem to ensure the prevention, early diagnosis and prompt treatment of some of the above-mentioned oral and dental problems that they may be predisposed to (18,19).

ATH, one of the main causes of upper airway obstruction, is considered a common disease among children (20, 21). It has been shown that by providing adequate oral health care in children with ATH, diseases such as dental caries, periodontal diseases and bad breath can be prevented. It is also recommended to start orthodontic treatment as soon as possible, if necessary (22). In this context, ENT specialists, dental practioners and orthodontists should work as a team in the treatment of children with ATH.

The variability of the orthodontic and dental examination practices and possibly the ability to recognize the prevalence of orthodontic and dental problems in children with ATH is reflected in the patient referral patterns from the ENT specialists to the orthodontists and dental practioners. While conditions such as sounds from tmj, jaw deviation, retrognathism, prognathism and crowding were resulted in high referral frequencies, other anomalies were not common reasons for referrals. Orthodontic problems were less likely to result in referral; these include missing teeth, delayed eruption, mouth breathing/snoring, spaces

and overbite. The lack of early age orthodontic screening has been evident for years in all countries. For this reason, it is clear that orthodontic protection should be increased at an early age if possible (23,24).

We could not define any other research regarding orthodontic and dental knowledge, screening and referral in children with ATH from ENT specialists in the literature. Therefore, we could only compare our results with researches evaluating pediatrician's knowledge and referrals for orthodontic problems, oral hygiene and dental caries (17,25,26). The results of the current study showed that the majority of the sample had admissible level of knowledge and attitude regarding malocclusion, oral and dental health and risk factors. However, the percentage of oral health related practices were fewer among ENT specialists which is line with an American national survey that conducted on pediatricians by Lewis et al (17). According to the results of a previous survey with 96 pediatricians in Greece, the majority were aware that the examination of the oral cavity was important, but did not have the appropriate knowledge to conduct a complete and systematic screening for orthodontic problems (27). In this previous study, a low frequency was detected in the examination of the position of teeth (54%) and jaws (51%), which comply with this study. Similarly, the results of this study show that %57.7 of ENT specialists examine the oral cavity of children with ATH for malocclusion. The reasons pediatricians referred patients to specialists varied from mouth breathing-snoring 24% (23/96) to face or teeth asymmetry 87% (84/96) (27). In this study, the reasons ENT specialists referred patients with ATH to specialists varied from missing teeth 15.4% to sounds from tmj 66.7%.

Mouth breathing/snoring which usually seen in children with ATH and most of the anomalies were not common reasons for referral. Therapeutic options include surgical extraction of hypertrophic adenoids and tonsils, as well as non-surgical alternatives such as oral appliances (OAs) (28). The dental practitioners can play an important role in treating those cases with oral appliances, who refuse the surgery, or those with structural abnormality in which myofunctional appliances are beneficial (28). Only 33.3 % of participants consult patients with ATH that need oral appliance for treatment of obstructive sleep apnea. %15.4 of them don't know this appliance. Therefore, it might be considered that ENT specialists have limited basic dental training, and this causes low confidence in oral cavity screening, recommendation, or consultation (16). 86.2% of the participants, stated that they needed more knowledge about oral and dental diseases and prevention of malocclusion. This result reveals that ENT specialists should be informed more about the subject both during and after medical education.

Moreover, many participants (95.9%) believed that ENT specialists must examine the teeth of children with ATH. Most participants (95.1%) considered their roles in children's teeth examination, the prevention of malocclusion and oral and dental diseases but few of them reported evaluating children's oral functional habits (68.3%) and the oral health examination for malocclusion (57.7%). Similarly, Alshunaiber et al. (16) and Di Giuseppe et al. (29) reported a low percentage of pediatricians who performed oral health examinations for children. However, the study of Indira et al. (30) found better practice levels, and many pediatricians (98.9%) reported that they included children's teeth examination in routine practice.

The majority of ENT specialists were aware of the importance of referral of patients with dental caries, gingival problems, malocclusion and parafunctional oral habit, but 57.7% of them consult with orthodontics and 30.9% of them consult with dentistry. In the present study, as in the study of Sezer et al. (31) conducted with pediatricians, insufficient knowledge on some aspects of children's parafunctional oral habits and orthodontic problems together with the associated practice among ENT specialists might be related to the lack of required dental training and education of the majority of participants. Also, decreased orthodontic referral frequency among ENT specialists who worked in governmental hospitals may be associated with a lack of clinical time for detailed examination.

## CONCLUSION

Ideally, all children should have orthodontic screenings in both dentistry and ENT practices as each specialty can provide care and advice for their patients' orthodontic and oral and dental health. ENT specialists can relate to patients with ATH from an early age. Since they usually examine their patients before orthodontists and dental practitioners, they have the opportunity to advise, guide and refer them when necessary. Being aware of the etiology, risk factors and impact of oral and dental diseases and orthodontic problems in children with ATH will support ENT specialists in making informed decisions and implementing comprehensive person-centered care plans.

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** Ethical permission required for the study to be carried out was obtained from Gaziosmanpaşa Training and Research Hospital Medical Researches Ethics Committee (Date: 28.04.2021, Decision No: 268).

**Informed Consent:** Informed consent form was obtained from volunteers.

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The author have no conflicts of interest to declare.

**Financial Disclosure:** The author declared that this study has received no financial support.

**Acknowledgments:** The author thank all ENT specialists for their participation in the study. The author would also like to thank Dr. Doğan Çakan for his kind support.

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