# Evaluation of the Effect of Allergic Rhinitis on Adenoid Hypertrophy and Otitis Media With Effusion Combination By Using Score For Allergic Rhinitis (Sfar)

## Adenoid Hipertrofi ve Effüzyonlu Otitis Media Birlikteliğinde Alerjik Rinitin Etkisinin Alerjik Rinit Semptom Skoru (Sfar) ile Değerlendirilmesi

Elif ERSOY CALLIOGLU[1], Kazım BOZDEMIR[2], Bengi ARSLAN[1], Caner DELIOGLU[1]

[1] Ankara City Training and Research Hospital, Department of Otolaryngology, Ankara, Turkey
[2] Yildirim Beyazit University, Department of Otolaryngology, Ankara, Turkey

## ABSTRACT

**Objective:** The aim of this study is to determine whether allergic rhinitis exerts any effect on middle ear pathology in patients undergoing operation for adenoid vegetation by using SFAR.

**Material and Methods:** In this study 72 patients with adenoid vegetation were analyzed retrospectively. Twenty-five patients (Group 1) underwent adenoidectomy and ventilation tube, while 47 patients (Group 2) underwent only adenoidectomy. Patients with adenoidectomy indications included those who were found to have 70-100% obstruction due to adenoid vegetation in nasopharynx via flexible endoscope, and patients undergoing VT included those who had intractable otitis media despite more than three months of treatment along with adenoid hypertrophy. SFAR was recorded after assessment of all the patients. Group 1 and Group 2 patients were compared using SFAR.

**Results:** No statistically significant difference was found between Group 1 and Group 2 in terms of allergic rhinitis score measured by SFAR (p=0.150). In the operated patient group, the rate of allergic rhinitis was significantly higher in those who are older than 7 years (p=0.020) No impact of gender was found on the rate of allergic rhinitis (p=0.829). No significant difference was found between Group 1 and Group 2 in the evaluation made with SFAR. (p=0273). Mean SFAR score was found to be 10.500+0.71 in Group 1 and 9.00+2.16 in Group 2.

**Conclusion:** In this study no impact of allergic rhinitis on adenoid hypertrophy and adenoid hypertrophy accompanied with otitis media with effusion was found using SFAR. In order to reach a definitive conclusion, further studies with higher number of patients and which include prospective invivo and invitro tests are required.

**Key Words:** Adenoids, Allergic Rhinitis, Otitis media with effusion

## ÖZ

**Amaç:** Adenoid vejetasyon nedeniyle opere edilen hastalarda orta kulak patolojisi saptanmasında alerjik rinitin etkisi olup olmadığını SFAR kullanarak saptamaktır.

**Gereç ve Yöntemler:** Bu çalışma adenoid hipertrofi nedeniyle 72 hastanın incelendiği retrospektif bir çalışmadır. 25 hastaya (Grup 1) Adenoidektomi+ventilasyon tüpü (VT) uygulaması, 47 hastaya (Grup 2) sadece Adenoidektomi uygulaması yapıldı. Adenoidektomi endikasyonu konulan hastalar yapılan fleksibl endoskopik muayenede nazofarinkste pasajı %70-100 arasında kapatan adenoid vejetasyonu saptanan hastalardan, VT uygulaması yapılan hastalar adenoid hipertrofi ile birlikte 3 aydan daha uzun süre aldığı tıbbi tedaviye rağmen gerilemeyen kronik effüzyonlu otitis mediaya (EOM) sahip hastalardan oluşmaktadır. Tüm hastaların değerlendirilmesi yapıldıktan sonra alerjik rinit semptom scoru (SFAR) kaydedildi. Grup 1 ve 2 hastalar SFAR değeri hesaplanarak karşılaştırıldı.

**Bulgular:** Grup 1 ve Grup 2 hastalar SFAR ile alerji yönünden karşılaştırıldığında gruplar arasında istatistiksel olarak anlamlı bir farklılık saptanmamıştır (p=0.150). Opere edilen hastalarda yaş ile birlikte alerjik rinit saptanması 7 yaşından büyük olan grupta istatistiksel olarak anlamlı artmıştır (p=0.020). Cinsiyetin alerjik rinit saptanması üzerine etkisi saptanmamıştır (p=0.829). Gruplar arasında SFAR değerlendirildiğinde Grup 1 ve 2 arasında istatistiksel olarak anlamlı değişiklik saptanmamıştır (p=0.273). Grup 1 de ortalama SFAR 10.50 ±0.71 iken, Grup 2 de 9.00±2.16 saptanmıştır.

Correspondence Address / Yazışma Adresi:
**Elif ERSOY ÇALLIOGLU**
Ankara City Training and Research Hospital,
Department of otolaryngology, Ankara, Turkey
E-posta: elifersoy78@hotmail.com

Received / Geliş tarihi : 31.01.2020
Accepted / Kabul tarihi : 03.03.2020
Online published : 10.03.2020
Elektronik yayın tarihi
DOI: 10.12956/tchd.682583

**Sonuç:** Bu çalışmada adenoid hipertrofi ve adenoid hipertrofiye eşlik eden EOM lı hastaların SFAR kullanılarak karşılaştırılmasında alerjik rinitin etkisi olmadığı saptanmıştır. Ancak kesin bir yargıya varmak için arttırılmış hasta sayıları içeren, diagnostik invivo ve invitro testleri içeren prospektif çalışmalara ihtiyaç vardır.

**Anahtar Sözcükler:** Adenoid, Alerjik rinit, Effüzyonlu otitis media

## INTRODUCTION

Adenoid hyperthrophy is one of the most common causes of nasal obstruction in childhood. Adenoid tissue hypertrophy occurs as a consequence of lymphoid and epithelial cell hyperthrophy in association with chronic inflammation. Although chronic inflammation usually results from chronic infections, chronic allergic reactions may also play role in it (1). In various studies, specific IgE synthesis and sensitisized mast cells have been detected in nasopharyngeal lymhpoid tissue (2). Adenoid vegetation may lead to middle ear pathologies such as recurrent acute otitis media, and otitis media with chronic effusion and sinus pathologies, irrespective of its size. Variation in middle ear symptoms in patients with adenoid vegetation suggests the presence of additional pathologies influencing eustachian functions.

It has been demonstrated in many studies that allergic reaction affects middle ear and eustachian tube mucosa in addition to nasal mucosa and nasopharyngeal mucosal membranes (3-6). It was also shown that the prevalance of allergic rhinitis increases in patients with chronic otitis media with effusion (6,7). Even though the incidence of allergic rhinitis in the community ranges between 10%-54%, in studies on its effect on adenoid tissue, middle ear and eustachian functions, variable results have been obtained (8,9). In the diagnosis of allergic rhinitis, history of allergic symptoms and invivo and invitro tests are utilized (10). However, in various studies, it was demonstrated that SFAR correlates with standard diagnostic tests and can be employed in the diagnosis and treatment of allergic rhinitis (11,12).

The aim of the present study was to determine whether allergic rhinitis exerts any effect on middle ear pathology in patients undergoing operation due to adenoid vegetation.

## MATERIALS and METHODS

The present study is a retrospective one in which 72 patients who underwent operation for adenoid vegetation in Ear, Nose and Throat Clinic during 2018-2019 were included. The data of the patients were retrospectively analyzed after approval of the study protocol by Academic Committee for Clinical Research (January 20, 2020; decree no: 14). Twenty five patients (Group 1) underwent Adenoidectomy+ventilation tube (VT), while 47 patients underwent (Group 2) only Adenoidectomy. Prior to operation, detailed histories were elicited and physical examination was carried out, determining operation indications. Age and sex of the patients were recorded. Patients considered indicated for adenectomy included those who were found to have adenoid vegetation which was found to close passage of nasopharynx at the rate of 70-100% with examination carried out using flexible endoscope. Patients with tonsil hypertrophy, septum deviation and nasal polyps were excluded from the study. Patients undergoing VT included those who had otitis media with chronic effusion, which was recalcitrant to more than 3 months of medical treatment, in addition to adenoid hypertrophy. After the evaluation of all patients, allergic rhinitis symptom scores (SFAR) were recorded. Patients with allergic rhinitis included those with SFAR score of 7 or over. Patients in Groups 1 and 2 were compared using SFAR.

### Statistical evaluation

The analysis of statistical data was carried out with SPSS 17 program. In continuous variables, descriptive statistics were expressed with mean. (+-) standard deviation and in categorical variables, it was expressed with number and percentage. In the analysis of categorical variables, chi square test was used while in the analysis of continuous variables. Mann Whithey U test was used, as the difference between mean values were not normally distributed $p<0.05$ value was considered statistically significant in all results.

## RESULTS

Overall 72 patients with adenoid hypertrophy were included in the study. Twenty five patients in Group 1 (34.7%) underwent Adenoidectomy+VT, while 47 patients in Group 2 (65.3%) underwent only Adenoidectomy. Mean age of the patients was 6.00 ± 2.18 in Group 1, while it was 7.40 ± 5.23 in Group 2. 61.1% of the patients was female, while, 38.9 % was male. 55.6% of the patients (40) was under the age of 7, while 44.6% (32) was over the age of 7. There was no significant difference between groups in terms of age and sex (p=0.059, p=0.580) (Table I).

No significant difference was found between Group 1 and 2 with regard to SFAR scores. (p=0.150) (Tablo II) .The rate of allergic rhinitis in patients that underwent operation was significantly higher in the age group over 7 (p=0.020). No significant effect of sex on the rate of allergic rhinitis was found (p=0.829).

The rate of allergic rhinitis was found to be %8 (2 patients) in Group 1, while it was 21.3% (10 patients) in Group 2. Overall rate of allergic rhinitis was found to be 16.7% (12 patients).

No significant difference was found between Group 1 and 2 with respect to SFAR scores (p=0.273). No statistically significant difference was found either when they were evaluated with

**Table I:** Comparison of demographic characteristics.

| | Group 1 | | Group 2 | | overall | | Pearson Chi-Square | p |
|---|---|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Number | Percentage | | |
| **Sex** | | | | | | | | |
| Female | 19 | 76.0 | 25 | 53.2 | 44 | 61.1 | 3.572 | 0.059 |
| Male | 6 | 24.0 | 22 | 46.8 | 28 | 38.9 | | |
| Overall | 25 | 100 | 47 | 100.0 | 72 | 100 | | |
| **Age group** | | | | | | | | |
| Under the age of 7 | 15 | 60.0 | 25 | 53.2 | 40 | 55.6 | 0.306 | 0.580 |
| Age 7 or over | 10 | 40.0 | 22 | 46.8 | 32 | 44.4 | | |
| Overall | 25 | 100.0 | 47 | 100.0 | 72 | 100.0 | | |

**Table II:** Comparion of rates of allergic rhinitis determined with SFAR between groups.

| | SFAR Score | | | | | | p |
|---|---|---|---|---|---|---|---|
| | Negative | | Positive | | overall | | |
| | Number | Percentage | Number | Percentage | Number | Percentage | |
| **Sex** | | | | | | | |
| Female | 37 | 84.1 | 7 | 15.9 | 44 | 100.0 | 0.829 |
| Male | 23 | 82.1 | 5 | 17.9 | 28 | 100.0 | |
| Overall | 60 | 83.3 | 12 | 16.7 | 72 | 100.0 | |
| **Condition** | | | | | | | |
| Group 1 | 23 | 92.0 | 2 | 8.0 | 25 | 100.0 | 0.150 |
| Group 2 | 37 | 78.7 | 10 | 21.3 | 47 | 100.0 | |
| overall | 60 | 83.3 | 12 | 16.7 | 72 | 100.0 | |
| **Age Group** | | | | | | | |
| Under the age of 7 | 37 | 92.5 | 3 | 7.5 | 40 | 100.0 | 0.020* |
| Age 7 and higher | 23 | 71.9 | 9 | 28.1 | 32 | 100.0 | |
| Overall | 60 | 83.3 | 12 | 16.7 | 72 | 100.0 | |

**Table III:** Comparison of SFAR between groups .

| | Score | | | | p |
|---|---|---|---|---|---|
| | Number | Mean | Standard Deviation | Rank | |
| **Sex** | | | | | |
| Female | 7 | 10.00 | 2.31 | 7.79 | 0.149 |
| Male | 5 | 8.20 | 1.10 | 4.70 | |
| **Age Group** | | | | | |
| Under 7 | 3 | 8.00 | 0.00 | 4.50 | 0.282 |
| 7 or over | 9 | 9.67 | 2.24 | 7.17 | |
| **Condition** | | | | | |
| Group 1 | 2 | 10.50 | 0.71 | 9.50 | 0.273 |
| Group 2 | 10 | 9.00 | 2.16 | 5.90 | |

respect to age and sex. Mean SFAR score was found to be 10.50±0.71 in Group 1, while it was found to be 9.00±2.16 in Group 2 (Table III).

## DISCUSSION

Although the prevalence of allergic rhinitis in the community is quite high and varies between 10% and 54%, in studies regarding its efect on adenoid tissue, middle ear and eustachian functions, variable results have been obtained (8,9). In the present study, the rate of allergic rhinitis was found to be respectively 8% and 21.3% in Groups 1 and 2 respectively using SFAR and overall rate of allergic rhinitis was 16.7%. This finding indicates that in children with adenoid vegetation, the combination of adenoid vegetation with otitis media with effusion does not lead to an increase in the incidence of allergic rhinitis. Among patients undergoing operation, the fact that the rate of allergic rhinitis increases in the groups over the age of 7 suggests that allergy prevents the regression of adenoid tissue.

In the diagnosis of allergic rhinitis, typical allergic symptom history and diagnostic laboratory tests are used (10). These

tests comprise invivo (specific IgE etc.) and invitro (skin tests ) tests (10). SFAR , is a test originally defined in 2002 and is used to determine the prevalence of allergic rhinitis (11). In various studies, it was shown that SFAR correlates with standard diagnostic tests and can be used in the diagnosis and treatment of allergic rhinitis (11,12). In the study of Ologe et al. (12), the sensititivity and specifity of SFAR in the diagnosis of allergic rhinitis was reported to be 94.8% and 95.1% respectively.

In the study of Griffin et al. (13), the rate of allergic rhinitis in children with adenoid vegetation was established to be 21.1%. Likewise, in the study of Ameli et al. (14), it was reported that in children without atopic sensitization, the incidence of adenoid hypertrophy increased and that there was inverse proportion between adenoid hypertropy and allergy. The results of the aforementioned studies are congruent with those of the present study. However, in the literature, there are also studies finding increase in the incidence of allergy among children with adenoid hypertrophy (5,16). In the studies of Moldrzynski et al. (15) and Sadeghi-Shabestarive et al. (16), it was stated that in allergic patients, adenoid hypertrophy occurs more commonly than normal population. There are also studies demonstrating that nasal steroids decrease the need for adenoidectomy by reducing the volume of adenoids (17,18). In the present study, the prevalence of allergic rhinitis was significantly higher among children over the age of 7, suggesting that, although the size of the adenoids decrease with age, this does not occur when it is concurrent with allergic rhinitis.

It was demonstrated in many studies that allergic rhinitis exerts effect on nasal and nasopharyngeal mucosa and eustachian tube functions (3-5). It is thought that mediators and cytokines released during allergic reactions lead to nasal and nasopharyngeeal edema and hypersecretion, resulting in eustachian dysfunction (3-6). In patients having otitis media with chronic effusion, it was reported that there is an increase in the prevalence of allergic rhinitis (6,7). In a study carried out with 87 patients with chronic secretory otitis media, it was shown that nasal allergy influences eustachian tube functions and leads to pressure changes in middle ear (6). The role played by allergy in otitis media with effusion may be attributed to nasopharyngeal inflammation and obstruction caused by edema in eustachian tube and to passage of bacteria from nasopharynx to middle ear via hypersecreation produced by allergic reaction. In the study conducted by Saifudin et al. in 2019, it was established in children with otitis media with effusion that prevalence of allergic rhinitis was high. In the study of Cafarelli et al. (20) allergic rhinitis was found in 16.3% of children with otitis media with effusion. In the present study, in patients who have adenoid vegetation along with otitis media with effusion no difference was found between two groups in terms of nasal allergy. This finding may be attributed to the evaluation of only the patients who have otitis media with effusion along with hypertrophic adenoid vegetation, variatons between regions, small number of patients and using SFAR for evaluation.

Limitations of the present study are that there were few patients, no comparison was made with healthy control groups and SFAR was used instead of diagnostic tests.

## CONCLUSION

In the present study, no affect of allergic rhinitis was found using SFAR on patients who have adenoid hypertrophy in addition to otitis media with effusion. However, further prospective studies involving diagnostic invivo and in vitro tests and higher number of patients are required in order to reach definitive conclusion on this issue.

**Compliance with Ethical Standards:**

**Conflict of Interest:** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Ethical approval:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent:** Informed consent was obtained from all individual participants included in the study.

## REFERENCES


1. Marseglia GL, Caimmi D, Pagella F, Matti E, Labó E, Licari A, et al. Adenoids during childhood: the facts. Int J Immunopathol Pharmacol 2011; 24: 1-5.
2. Ganzer U, Bachert C. Localization of Ig Esynthesis in immediate-type allergy of the upper respiratory tract. ORL J Otorhinolaryngol Relat Spec 1988; 50: 257-64.
3. Fireman P. Otitis media and eustachian tube dysfunction: Connection to allergic rhinitis. J Allergy Clin Immunol 1997; 99: 787Y97.
4. Stuar M. Late phase allergy and eustachian tube dysfunction. Otolaryngol Head Neck Surg 2001; 125: 339Y45.
5. Doyle WJ. The link between allergic rhinitis and otitis media. Curr Opin Allergy Clin Immunol 2002; 2: 21Y5.
6. Zdenek Pelikan. Audiometric Changes in Chronic Secretory Otitis Media Due to Nasal Allergy. Otology & Neurotology 2009;30:868-75.
7. Alles R, Parikh A, Hawk L, Darby Y, Romero JN, Scadding G. The prevalence of atopic disorders in children with chronic otitis media with effusion. Pediatr Allergy Immunol 2001:12: 102-6.
8. Asher MI, Montefort S, Björkstén B, Lai CK, Strachan DP, Weiland SK, et al. Worldwide time-trends in the prevalence of symptoms of asthma, allergic rhinoconjuctivitis, and eczema in childhood: ISAAC phases one and three repeat multicountry cross sectional surveys. Lancet 2006;26:733-43.
9. Katelaris CH, Lee BW, Potter PC, Maspero JF, Cingi C, Lopatin A, et al. Prevalence and diversity of allergic rhinitis in regions of the world beyond Europe and North America. Clin Exp Allergy 2012;42: 186-207.

10. Bousquet J, Khaltaev N, Cruz AA, Denburg J, Fokkens WJ, Togias A, et al. Allergic Rhinitis and its Impact on Asthma (ARIA) 2008 update (in collaboration with the World Health Organization, GA 2 LEN). Allergy 2008;63:8-160.
11. Annesi-Maesano I, Didier A, Klossek M, Chanal I, Moreau D, Bousquet J. The score for allergic rhinitis (SFAR): a simple and valid assessment method in population studies. Allergy 2002;57: 107-14.
12. Ologe FE, Adebola SO, Dunmade AD, Adeniji KA, Oyejola BA. Symptom score for allergic rhinitis. Otolaryngology –Head and neck surgery 2013;148: 557-63.
13. Griffin JL, Ramadan HH, Adham RE. Prevalance of IgE-mediated hypersensitivity in children with adenotonsillar disease. Arch Otolaryngol Head Neck Surg 1994; 120: 150-3.
14. Ameli F, Brocchetti F, Tosca MA, Signori A, Ciprandi G. Adenoidal hypertrophy and allergic rhinitis: is there aninverse relationship? Am J Rhinol Allergy 2013; 27: e5-10.
15. Modrzynski M, Zawisza E. An analysis of the incidenceof adenoid hypertrophy in allergic children. Int J Pediatr Otorhinolaryngol 2007;71:713-9.
16. Sadeghi-Shabestari M, Jabbari Moghaddam Y, Ghaharri H. Is there any correlation between allergy and adenotonsillar tissue hypertrophy? Int J Pediatr Otorhinolaryngol 2011;75: 589-91.
17. Georgalas C, Thomas K, Owens C, Abramovich S, Lack G. Medical treatment for rhinosinusitis associated with adenoidal hypertrophy in children: an evaluation of clinical response and changes on magnetic resonance imaging. Ann Otol Rhinol Laryngol 2005;8:638-44.
18. Demirhan H, Aksoy F, Özturan O, Yıldırım S, Veyseller B. Medical treatment of adenoid hypertrophy with "fluticasone propionate nasal drops". Int J Pediatr Otorhinolaryngol 2010;74:773-6.
19. Saifudin N, Husaina S, Goha BS. Prevalence of allergic rhinitis in children with otitis media with effusion. Eur Ann Allergy Clin Immunol 2019 Oct 31. doi: 10.23822/EurAnnACI 1764-1489.119.
20. Caffarelli C, Savini E, Giordano S, Gianlupi G, Cavagni G. Atopy in children with otitis media with effusion. Clin Exp Allergy 1998;28:591-6.