

The Use of a Screening Questionnaire to Determine the Incidence of Allergic Rhinitis in Singers With Dysphonia

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Objectives: To report the incidence of allergic rhinitis in singers with nonspecific laryngeal examination findings and to correlate the incidence of allergic rhinitis with their vocal symptoms when present.

Design: A retrospective review of all the medical records of singers with nonspecific laryngeal findings who presented to a specialty voice center for either vocal training or therapy between June 2002 and September 2005.

Setting: Specialty voice center.

Participants: Forty-five singers with nonspecific laryngeal findings who presented to a specialty voice center for either vocal training or therapy.

Main Outcome Measures: A standardized validated

questionnaire for evaluation of allergic rhinitis was filled out by all the subjects. A score above 0 was considered positive.

Results: The total prevalence of allergic rhinitis was 87% (39 of 45 subjects). The singers with vocal symptoms were approximately 15% more likely to have allergic rhinitis than those with no vocal symptoms (92% vs 84%). Singers with more than 2 vocal symptoms had a 25% higher likelihood of having allergic rhinitis.

Conclusions: The incidence of allergic rhinitis in singers is extremely high. Hidden respiratory allergies may affect the professional voice. Proper awareness and a multidisciplinary approach are indispensable for proper diagnosis and treatment.

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ALLERGIC RHINITIS IS A global health issue that affects 10% to 25% of the population, with rates approaching 40% in some age groups.^{1,2} It has been strongly associated with asthma, rhinosinusitis, otitis media, and many other chronic medical conditions that affect daily activities.³ Because allergic rhinitis is not life-threatening, its morbidity is often underestimated. Its global prevalence is increasing worldwide, touching individuals with different occupations living in various environments.⁴ While occupational rhinitis is a well-established entity, in which exposure to a specific occupational allergen results directly in allergic symptoms, there are occupations in which exposure to non-allergic triggers is commonly encountered.⁵ One such occupation is that of singers, who may be exposed to many irritant triggers, such as smoke, perfumes, cosmetics, and cold air. Allergic symptoms such as nasal congestion, postnasal drip, and throat clearing are aggravated in con-

cert halls and dressing rooms, where dust and mold are commonly found in curtains and trappings. As a result, frank hoarseness or subtle vocal complaints such as intermittent vocal breaks and fatigability are present as a result of dryness or the presence of excess mucus in the vocal tract. This condition is often underappreciated, particularly in professional voice users, who are frequently exposed to environmental challenges that are difficult to control. The laryngeal examination in these subjects are usually nonrevealing. The findings are either normal or classic, eg, mild vocal fold edema or erythema; there may also be thick secretions with mucus stranding across the vocal folds.⁶

According to our Pub Med search, the incidence of allergic rhinitis in singers with nonspecific laryngeal findings has not been reported in the literature. The objectives of our study were to assess the incidence of allergic rhinitis in this group of singers and to correlate the incidence of allergic rhinitis to their vocal symptoms when present.

Table 1. Baseline Characteristics of Study Sample and Main Findings*

Variable	Values
Sex, male	23 (51)
Age, y	
Mean (SD)	33.8 (14.0)
Range	17-77
Prevalence of selected symptoms	
Pitch breaks	3 (7)
Vocal fatigue	14 (31)
Loss of range	14 (31)
Hoarseness	8 (18)
No. of symptoms	
0	20 (44)
1	15 (33)
2	6 (13)
3	4 (9)

*Values other than age are expressed as number (percentage).

METHODS

The medical records of all singers who presented to the specialty voice center between June 2002 and September 2005 were reviewed. Singers with positive laryngeal videostroboscopic examination findings, ie, with a specific diagnosis such as impaired vocal fold mobility or the presence of nodules, polyps, cysts, sulcus vocalis, or other lesions, were excluded from the study. Those with nonspecific laryngeal findings, such as the presence of minimal edema or redness of the vocal folds, often labeled as functional disorders, were included in the study and were referred to as *subjects with nonspecific diagnosis*. A total of 45 cases were available and were included in the study. The subjects were subdivided into 2 subgroups: those with no vocal symptoms who presented to the specialty voice center just for vocal training or enhancement (n=20), and those who had vocal symptoms (n=25). The vocal symptoms included hoarseness, vocal fatigue, pitch break, and loss of vocal range.

A standardized, validated questionnaire for the evaluation of allergic rhinitis, originally developed by Bauchau et al,⁷ was filled out by all subjects. A score above 0 was considered positive for allergic rhinitis.

Frequency and mean (SD) were used to describe categorical and continuous variables, respectively. The relationship between the various symptoms and allergic rhinitis was examined, and the relative risk increase was estimated based on the following computation: [(prevalence in exposed/prevalence in unexposed)-1], with exposure being defined as when the symptom is present. All analysis was conducted using SPSS software (SPSS Inc, Chicago, Ill).

RESULTS

The male-female ratio was close to 1:1. The mean (SD) age was 33.8 (14.0) years. The prevalence of vocal symptoms in the subgroup with dysphonia ranged between 7% (n=3) for pitch breaks and 31% (n=14) for vocal fatigue and loss of range. Approximately 56% of the subjects had at least 1 vocal symptom (**Table 1**). The total prevalence of allergic rhinitis was 87% (n=39). Singers with vocal symptoms were approximately 15% more likely to have allergic rhinitis than those with no vocal symptoms (92% vs 84%). The highest relative risk increase was observed among those with hoarseness (19%), followed

Table 2. Prevalence of Allergic Rhinitis in the Various Groups of Exposure Symptoms

Variable	Prevalence of Allergic Rhinitis, %	Relative Risk Increase Because of Symptom*
Pitch breaks		
Absent	86	...
Present	100	17
Vocal fatigue		
Absent	84	...
Present	93	11
Loss of range		
Absent	84	...
Present	93	11
Hoarseness		
Absent	84	...
Present	100	19
No. of symptoms		
0	80	...
1	87	8
≥2	100	25
Total	87	...

*Based on increase in relative risk [(prevalence in exposed/prevalence in unexposed)-1].

by those with pitch breaks (17%), although this increase did not reach statistical significance ($P=.24$). Singers with more than 2 vocal symptoms had a 25% higher risk of having allergic rhinitis (**Table 2**).

COMMENT

Dysphonia in singers with allergic rhinitis is a very frustrating condition. Despite the various descriptions cited in the literature, the exact cause and nature of this entity remain unclear. The prevalence of allergic rhinitis in both functional and organic voice disorders makes it difficult to identify the exact pathogenetic role of allergic rhinitis as an independent variable in the wide repertoire of vocal abnormalities. Laryngoscopic and stroboscopic findings in patients with allergic rhinitis may be normal or nonspecific. The presence of mild edema, redness, or thick mucus is often reported, and many of these cases are labeled as functional dysphonia. These laryngeal findings are similar to those seen in patients with laryngopharyngeal reflux. Even in the absence of typical symptoms of heartburn and regurgitation, patients with a history of dysphonia are up to 50% more likely to have laryngopharyngeal reflux, which makes it very difficult to be conclusive regarding the diagnosis and interpretation of these findings. The clinical picture in such cases is also very elusive, which makes laryngopharyngeal reflux, when present in patients with allergic rhinitis, a very confounding factor.^{8,9} Therefore, the lack of specific symptoms and/or laryngoscopic findings presents a challenge to both patients and medical practitioners. As a result, the question of whether allergic rhinitis along with laryngopharyngeal reflux is circumstantially present in most cases of organic and functional vocal dysfunction or whether they are true etiologic factors has not been answered.

To our knowledge, there is no study that has investigated the incidence of allergic rhinitis in singers with nonspecific laryngeal findings who present either for vo-

cal training or for treatment of their dysphonia. In our study, the high prevalence of allergic rhinitis in this group of singers with nonspecific laryngoscopic findings is substantial. A total of 39 (87%) of the 45 study subjects had a positive score indicative of allergic rhinitis, a figure that highly exceeds the average incidence of 25% to 40% observed in the common population. Furthermore, the results have shown that singers with vocal symptoms are more likely to have allergic rhinitis, which again strongly suggests the possible etiologic role of allergic rhinitis in this subgroup of patients.

Allergic rhinitis is an inflammatory condition of the nasal mucosa caused by an allergen-induced IgE-mediated reaction in which different inflammatory cell types, as well as the mucosal surface epithelium, seromucous glands, and microvasculature, are involved.¹⁰ Nonspecific nasal hyperreactivity, defined as an increased nasal response to a normal stimulus, has also been shown to exist in allergic rhinitis. Hypotheses proposed for this phenomenon include damage to the epithelial barrier and increased sensitivity of irritant receptors in the mucosa.¹¹ In addition to allergic triggers, nonallergic triggers and irritants that aggravate the already inflamed nasal mucosa can also affect patients with allergic rhinitis. As a result, a form of chronic persistent inflammation has been confirmed in patients with both seasonal and perennial types of allergic rhinitis.^{12,13} Despite the lack of any symptoms, patients with this persistent underlying inflammation are at risk of developing subtle symptoms when they are exposed to irritant triggers. In professional voice users, and singers in particular, subtle vocal complaints, even while appearing asymptomatic, are a source of annoyance and despair. Singers with allergic rhinitis may have hoarseness, huskiness, breathiness, loss of voice, pitch breaks, reduced pitch range and power, unsteady voice, and throat discomfort, pain, or tightness. They also often have problems in vocal control, pitch range, and ability to project their voice. In our study, the most common vocal symptoms in singers with nonspecific laryngeal findings were hoarseness followed by pitch breaks, vocal fatigue, and loss of range, and 93% (23/25) of these singers had allergic rhinitis, a relatively high figure. These multifaceted complaints can be the manifestation of alterations in the various components of the vocal apparatus that affect the singer's needs and capacities. It has been speculated that these complaints are attributable to postnasal drainage caused by hypersecretion from the nasal glands. There is an increase in the discharge of mucus from inferior turbinate goblet cells, which is attributed to an increase in nasal goblet cell functional activity and which ultimately drains posteriorly onto the oropharyngeal and laryngeal tissue, resulting in an irritating cough, throat clearing, and dysphonia.¹⁴ In addition to the postnasal drainage, other mechanisms, such as direct mucosal swelling and local mucous secretions in the laryngeal area, cannot be discounted. Increased tissue viscosity or thickening of the seromucous vocal fold surface layer can interfere with vocal fold vibration, which in turn may result in an increase in the phonatory effort. Beside these rheologic factors, the effect of allergy on respiration also cannot be underestimated, as both systems, the respiratory and the phonatory, share common

anatomical ground and structures. Breathing acts as the power supply for sound emission by vibrating the vocal folds. Healthy phonation requires adequate breath support and control. Respiratory allergies can cause a decrease in pulmonary function, excessive secretions in either the lower or upper airway, and edema of the vocal folds and pharynx, all of which can result in alterations in the vocal signal and resonance characteristics of the voice.¹⁵ Such impairment may cause a lack of coordination between the various muscles of respiration and phonation, with resultant various vocal complaints.

CONCLUSIONS

The incidence of allergic rhinitis in singers is extremely high. The presence of ill-defined vocal complaints or nonspecific laryngeal findings in a singer should prompt an evaluation for allergies. A detailed history of the symptoms in addition to skin prick testing may be mandatory. Hidden respiratory allergies require different strategies for establishing good vocal hygiene and maintaining a healthy voice. Therefore, a multidisciplinary approach is indispensable for the diagnosis and treatment of these disorders.

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