

## Diagnosis and Management of Seasonal Allergies

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### Abstract

**Introduction:** Seasonal allergy or allergic rhinitis (AR) is a symptomatic inflammatory reaction that affects the nasal mucosa and develops usually during specific periods of the year. It is the most common cause of nasal mucosal inflammation.

**Aim of Work:** In this review, we aim to review the most recent literature regarding the diagnosis and management of seasonal allergies.

**Methods:** We did a systematic search for seasonal allergies using PubMed search engine and Google Scholar search engine.

**Conclusion:** Allergic rhinitis is considered one of the most common atopic allergic condition affecting about 20% of the population worldwide, and have a negative effect on the personal, economic and quality of life a large population around the world. AR must be well understood and effective diagnosis and treatment plans must be developed. A routine screening test must be done by the primary health care providers in order to recognize neglected cases of AR.

**Keywords:** Seasonal Allergies; Allergic Rhinitis; Inflammation

### Introduction

#### Epidemiology

Seasonal allergy or allergic rhinitis (AR) is a symptomatic inflammatory reaction that affects the nasal mucosa and develops usually during specific periods of the year. It is the most common cause of nasal mucosal inflammation. AR is an IgE-mediated hypersensitivity reaction triggered after exposure to different types of environmental allergens. Microscopically, allergic rhinitis is characterized by inflammatory cells infiltration of the nasal mucosa and submucosa [1]. Clinically, allergic rhinitis is presented with many major symptoms including sneezing, watery nasal discharge, nasal obstruction and nasals itching, lasting for one hour a day for two days at least [2,3].

According to the WHO, the prevalence of Allergic rhinitis is increasing worldwide, about 20% of the total population around the globe suffer from allergic rhinitis. 30% of the adults and 40% of children in the United States suffer from allergic rhinitis, with an estimated number of 60 million patients [4,5].

Allergic rhinitis was found to have an enormous negative effect on the economy, as the symptoms of AR affect all aspects of daily life and negatively affect the quality of life, sleep and work/school performance. In the United States alone in 1996, the economic burden of allergic rhinitis was estimated to be 1.9 billion dollars, added to another 4 billion dollars of AR comorbidities [6]. In 2007 a cohort study in the US revealed that AR was responsible for about 25% of all decrease in productivity, more than any other illness including hypertension, diabetes, and heart disease [7].

Allergic rhinitis usually passes undetected in patients due to its nature and long-standing symptoms, most of the allergic rhinitis patients do not seek any medical treatment as they do not recognize its effect on the different aspect of their life.

### Methodology

We did a systematic search for seasonal allergies using PubMed search engine (<http://www.ncbi.nlm.nih.gov/>) and Google Scholar search engine (<https://scholar.google.com>). All relevant studies were retrieved and discussed. We only included full articles.

The terms used in the search were: seasonal allergies; allergic rhinitis; inflammation.

### Clinical presentation

Clinically, AR is presented as a classic IgE-mediated allergic response. Different types of mediators including mast cells, macrophages, eosinophils and lymphocytes, infiltrate the nasal mucosa as a response to the introduced allergen. Common types of allergens include dust mite, animal dander, molds and different types of food [8].

Classically, allergic rhinitis is presented with four main symptoms; sneezing, rhinorrhea, nasal congestion and itching. The conjunctiva can be affected also by the allergic reaction following the same pathophysiology of AR, showing itchy and watery eyes. Many patients may not pay any attention to the seasonal nature of their symptoms and misdiagnose it as a normal viral related symptom. Many patient's consider nasal congestion to be a serious problem preventing them from practicing everyday activity. A previous study conducted in 2007 revealed a significant effect of AR symptoms on performance and productivity in 74% of patients. 50% of the patients reported changes in their sleep patterns, with reports of tiredness, irritability and general malaise 61%, 38% and 23.5% respectively [9].

The clinical picture of allergic rhinitis varies between patients according to their age. In late childhood and early adults, the main complaint is rhinorrhea, patients in this age group reported blowing their noses. In the younger age group and early childhood where patients have not learned to pick their nose snorting, sniffing, or coughing was reported by the mother as a way to expel secretions. Many patients are presented with nasal injuries and dryness as a result of the constant manipulation and rubbing of the nose as a try to expel the congestion and secretions [10]. Many other symptoms can be seen including allergic shiners as a result of the increased blood flow that accompanies the inflammation. In children, special allergic facies (opened mouth with retracted chin and elongation of the face, with high arching palate) can be seen as a result of the continuous mouth breathing due to nasal obstruction [11]. As an allergen-mediated disorder that affects parts of the respiratory system, allergic rhinitis is considered to be very similar to other allergic diseases of the respiratory tract such as asthma. Furthermore, asthma and allergic rhinitis are considered to be comorbid; as 85% of asthmatic patients suffer from allergic rhinitis. And 40% of AR patients have or eventually will develop asthma. Consequently, many guidelines recommend evaluating asthma patient for allergic rhinitis, and AR patients for bronchial asthma [12]. Recently, studies found that the allergic cross-linking of IgE receptors could explain the link between the upper and lower respiratory tract IgE mediated diseases; as both have very similar physiological and morphological features. Thus, allergic rhinitis attacks may trigger or further exacerbate an already existing case of bronchial

asthma. The lower respiratory tract may be irritated by the postnasal dripping in AR patients, air resulting from mouth breathing in AR patients may provoke attacks of bronchial asthma. Furthermore, bronchial constriction can be a result of the rhinobronchial reflex after stimulating the nasal mucosa [12].

There are many other different types of non-AR nasal inflammation, that must be distinguished from allergic rhinitis including infectious, vasomotor, drug or hormone-induced rhinitis. Cases of rhinitis experienced during the pregnancy are usually hormonal induced, it resolves spontaneously after delivery and can affect about 30% of pregnant patients at different gestational ages [13,14]. Vasomotor rhinitis (VMR), is an idiopathic case of rhinitis resulting from increased cholinergic activity [15]. It can be triggered by many environmental factors include cold air, humidity and atmospheric pressure. VMR is usually presented with a clinical picture similar to that of AR including rhinorrhea, congestion, headaches and coughing. With no sneezing, nasal itching or Ocular symptoms as the trigger affects the nasal mucosa locally and is not IgE- mediated [14].

### Diagnosis

#### History and symptoms

Regarding the allergic nature of allergic rhinitis, any sign of allergic reaction should suggest the diagnosis. Allergic rhinitis diagnosis is established when two or more of the cardinal symptoms of AR including nasal congestion, rhinorrhea, sneezing, and itching are presented for more than one hour on more than 2 days [16]. A family history of any atypical disease should suggest an AR diagnosis. Then, the physician must try to identify the allergic factor responsible for the allergic reaction based on the patient's history. Some of the known allergens that must be investigated include smoke, pollen, molds, mites, animal fur, and textile flooring. Many pharmaceutical medications are known to be allergens responsible for triggering allergic reactions including NSAID pain killers, aspirin and anti-hypertensive drugs [4,6]. A previously published systematic review suggested that the existence of many other comorbidities suggests the diagnosis of allergic rhinitis including asthma, conjunctivitis, otitis media and sleeping disorder. Usually, the symptoms of allergic rhinitis are confused with the common cold, thus a careful history of common cold must be taken emphasizing the severity, frequency and annual seasonal nature of the symptoms.

#### Physical examination

Although the diagnosis of allergic rhinitis can be established based on history alone. A physical examination can be very useful to exclude any other possible diagnosis. Otoscopy and rhinoscopy have been proven to be useful in confirming AR diagnosis or excluding other possible conditions [6,9]. Rhinoscopy has been proven to be useful for diagnosing nasal polyp (NP) or a deviated septum. Both of the mentioned conditions can obstruct the airways causing symptoms that can mimic persistent nasal congestion.

#### Skin testing

Allergy testing can be done to identify the causative allergic agent in patients who do not respond to the normal lines of treatment and thus require further targeted therapy [4]. Allergy testing can be done either as a skin prick test or by measuring the levels of serum specific IgE. Clinical skin prick testing (SPT) has been used to identify the IgE-mediated allergic agents for a long time. It only takes about 20 minutes and is considered to be a fast, safe and effective way to identify the causative allergen and establish an AR diagnosis. Using a normal SPT, multiple potential allergens can be tested in a single session. Many patients and technical-dependent factors can affect the results of the (SPT) test. As (SPT) is considered immunological based test, many other pre-excitant conditions can affect its results including immunodeficiency, diabetes, or hypertension [17].

Another possible alternative test is Intradermal testing (IDT) of allergens. Where the possible allergens are introduced intra-dermally. While IDT is considered to have higher sensitivity than SPT, it is more painful, takes much more time, has a high rate of false-positive results and has a higher risk of a systemic reaction.

### Serum specific IgE level

Normally skin tests are considered to be fast and safe ways to diagnose allergic rhinitis. Both IDT and SPT are contraindicated in cases of known anaphylaxis, pregnant patients, and extensive skin conditions. In such cases, serum specific IgE levels are measured SSIgE. Such a test limits the interference of antihistamines or any other possible drug [18]. A previously published study compared between SPT and SSIgE recommended that SSIgE must not replace SPT, but instead used as a complementary test to the SPT [19].

After establishing a diagnosis of allergic rhinitis, the disease must be properly staged in order to set the best plan of treatment. Previously, allergic rhinitis was divided into two categories: seasonal and perennial AR. Where the perennial AR is presented throughout the year and the seasonal AR usually occurred at a fixed particular time of year.

A new classification of allergic rhinitis has been adopted where the symptoms of allergic rhinitis are divided according to its duration and severity. The duration of AR symptoms may be either intermittent (less than 6 weeks) or persistent. AR symptoms are also classified according to the severity of the symptom where mild symptoms have no effect on the patient's daily activities or sleep. And more moderate to severe symptoms can cause sleep impairment and affect the work/life impairment

### Management and treatment

Regarding the immunological nature of allergic rhinitis as a type 1 hypersensitivity-mediated inflammatory reaction, there is no known cure for such a case. Allergic rhinitis is managed symptomatically. The management of allergic rhinitis involves many steps starting from the identification and avoidance of the causative allergen, then pharmacological treatment can be started including oral antihistamines, intranasal antihistamines, intranasal corticosteroids and leukotriene receptor antagonists.

### Avoidance

In cases of allergic rhinitis, exposure to well-known allergens and irritating agents must be minimized. Allergens and irritants including dust mites, molds, pollens, pet's dander and tobacco smoke should be avoided. Although avoiding the allergens can be somehow challenging and difficult, many effective strategies have been improved to prevent the growth of mites such as the usage of allergen-impermeable covers for beddings and windows, a combination of and decreasing the indoor humidity less than 50% and using hot water 60°C in cleaning was found to be effective in inhibiting the growth of mites [20]. Exposure to different Pollen can be limited by limiting the time spent outdoors and closing the windows and doors. As regarding pet's dander, the patient must limit the exposure and remove the pet from the house, such a strategy was found to decrease the symptoms in 4 to 6 months [6]. Some studies reported that the use of commercially available air filters was associated with decreased allergic symptom indoor [21].

### Nasal irrigation and saline nasal spray

Many studies reported decreased allergic symptoms associated with saline nasal spray or high-volume nasal irrigation in both AR and asthma patients [22]. In 2012 a systematic review reported that nasal irrigation with isotonic saline was associated with less allergic and asthmatic symptoms. With a 27.66% decrease in nasal symptoms [23].

### Oral antihistamines

Oral antihistamines have been used in treating allergic rhinitis for a long time, and have proved to be an effective treatment of AR. First-generation antihistamines have been used since the 1940s, both through medical prescriptions and as over-the-counter drugs. First-generation antihistamines are not H1-receptor-selective and cross the blood-brain barrier to affect the dopamine, serotonin, and acetylcholine receptors. Thus, it has several side effects including sedation, memory impairment and psych-motor dysfunctions. Second-generation antihistamines do not cross the blood-brain barrier, so it has less CNS effects with the same efficacy in treating the symptoms of Allergic rhinitis [24]. Furthermore Second-generation antihistamines are considered to be safer than the first generation with reduced

cardiovascular side effects such as prolonged QT. Many RCTs have reported statistically better results associated with the use of antihistamines comparing to placebo usage in reducing the symptoms of allergic rhinitis [25]. When studying the side effects of anti-histaminic drugs, 7% of the general population was reported to have a relatively slow metabolism of antihistaminic drugs. Thus, raising the risk of un-wanted cardiovascular and CNS side effects [25].

### Intranasal antihistamines

The use of topical antihistamines intra-nasally has been proven effective in reducing itching, sneezing and rhinorrhea [26]. However, better results were reported using intra-nasal corticosteroids other than its lack of effect in treating eye symptoms [27]. Intranasal antihistamines can be used to reduce allergic rhinitis symptoms in patients who cannot tolerate the side effects of oral antihistamines. Many side effects were reported such as mild sedation and a metallic taste in the mouth [28].

### Intranasal corticosteroids

Intranasal corticosteroids are considered to be the best line of treatment in managing the symptoms of allergic rhinitis, in patients with mild to moderate persistent allergic symptoms, intranasal corticosteroids are recommended to be used as the first-line of treatment. Since intranasal corticosteroids are not absorbed systemically, they are presented with fewer side effects, steroids have anti-inflammatory effects, thus, it functions by inhibiting the cellular inflammatory response and inhibiting the release of cellular cytokines, decreasing leukotriene and prostaglandin response and reducing the production of mucus [29]. Intranasal corticosteroids are considered to be fast-acting preparations that start acting after only 30 minutes and have relatively long half-life with an effect that last for several hours. Most intranasal corticosteroids are considered to be safe during the pregnancy, it can be used as prescribed or over-the-counter drugs [29]. Another positive point is that unlike many other lines of treatment, intranasal corticosteroids have a positive effect in treating any allergic ocular symptoms [30].

Headache is the most common side effect of using intranasal corticosteroids, other side effects include epistaxis, throat irritation, and nasal dryness [31].

Corticosteroids are recommended to be used with caution in children and growing infants. While some trails reported it to be a safe line of treatment with no effects on skeletal growing and head circumference [32], other studies reported a slight, yet statistically significant difference in growth velocity in children treated with intranasal corticosteroids [33].

### Leukotriene receptor antagonists

Although leukotriene receptor antagonists are FDA approved drugs for treatment of AR symptoms, it has been reported to have minor effects in treating nasal congestion and other AR symptoms [34]. It is considered to be less effective than other lines of treatment such as corticosteroids and antihistamines. In leukotriene receptor antagonist treatment, the allergic agent is introduced into the body either by subcutaneous immunotherapy (SCIT) or sublingual immunotherapy (SLIT). With slowly increasing weekly doses for 6 to 8 months until the patient develops allergen resistant. With maintenance doses every month for 3 to 5 years. In 2009 a previous Cochrane review confirmed the efficacy of leukotriene receptor antagonist treatment with no side effects and no fatalities reported [35,36].

Many other therapeutic modalities have been tested and reported including acupuncture, nasal air filters. But none of it have been recommended as a line of treatment of allergic rhinitis symptoms [36].

## Conclusion

Allergic rhinitis is considered one of the most common atopic allergic condition affecting about 20% of the population worldwide and have a negative effect on the personal, economic and quality of life a large population around the world. AR must be well understood, and effective diagnosis and treatment plans must be developed.

A routine screening test must be done by the primary health care providers in order to recognize neglected cases of AR. Although a simple history taking and simple physical examination are enough to establish a diagnosis with allergic rhinitis, many further tests are including dermal and serum tests are available in order to diagnose cases not recognized by history and physical examination. Unfortunately, regarding its nature, no cure is currently available for AR. Many lines of symptomatic treatment are available including oral medications, topical sprays, and immunological treatment. Intranasal corticosteroids are considered to be the best and most effective line of treatment with the least side effects. Regardless of the chosen line of treatment, triggering allergic factors must be avoided.

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