Allergic rhinitis

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Abstract

Allergic rhinitis involves an inflammatory response of the nasal mucous membranes and is thus classically characterised by nasal congestion, itching, a runny nose and sneezing. However, multiple ear, nose and throat organs may be involved, each contributing their own additive signs and symptoms and risk for complications. The classification of allergic rhinitis is now based on the symptom duration and severity and no longer annual seasons. The golden standard remains the use of intranasal corticosteroids, despite the availability of several other treatment options. This article will explore the pathophysiology, classification, sign and symptoms and the management of allergic rhinitis.

Keywords: allergy, antihistamine, allergic rhinitis, corticosteroids, decongestants, rhinitis

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Pathophysiology

During an episode of allergic rhinitis, mast cells, CD4-positive T cells, B cells, macrophages, and eosinophils present in the nasal lining resulting in an anti-inflammatory response. This response is due to allergens such as dust, pollen, moulds and animal dander. The T cells cause the release of immunoglobulin (IgE), which results in histamine and leukotrienes that cause arteriolar dilation, increased vascular permeability, itching, rhinorrhea (runny nose), mucous secretion and smooth muscle contraction.[1] This is the immediate reaction. The late phase reaction is the release of eosinophilic infiltrates, which presents as hyposmia, chronic obstruction, post-nasal mucous discharge and nasal hyperreactivity.

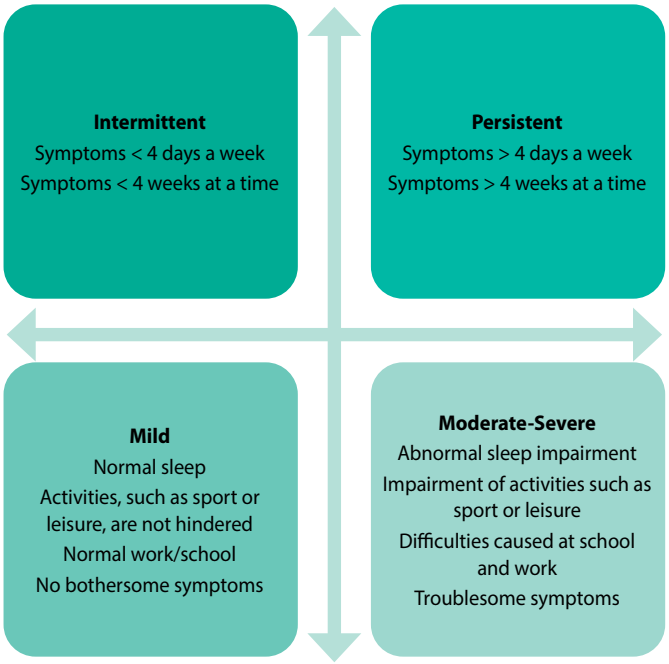

Figure 1: Classification of allergic rhinitis[1,2]

Classification of allergic rhinitis

Traditionally, allergic rhinitis was classified as either seasonal (hay fever) allergic rhinitis that occurs during spring and is caused by specific allergens such as pollen, grasses and weeds, or as persistent allergic rhinitis that occurs all year round and is in response to non-seasonal allergens such as dust mites, animal dander and moulds. Table I provides some of the common risk factors for allergic rhinitis. However, due to patients not fitting into the above descriptions and sometimes having both seasonal and perennial allergic rhinitis, the classification has been modified as per the Allergic Rhinitis and its Impact on Asthma guideline (ARIA). The classification is now based on symptom duration (intermittent or persistent) and severity (mild, moderate or severe), see Figure 1.[1,2]

Table I: Risk factors for allergic rhinitis[2,3]

- Atopic diseases such as allergic rhino-conjunctivitis, asthma, atopic dermatitis, food allergies (typically genetic)
- Ethnic origin other than white European
- High socio-economic status
- Environmental pollution
- Birth during pollen season
- No older siblings
- Late entry into nursery or preschool education
- Heavy maternal smoking during the first year of life
- Exposure to indoor allergens such as animal dander and dust mites
- High concentrations of serum IgE before the age of 6 years
- Early introduction of foods or formula

Signs and symptoms

Allergic rhinitis is defined as inflammation of the mucous membranes of the nose, sinuses, pharynx, eyes, eustachian tubes and the middle ear due to allergens. Because an inflammatory response is responsible for this condition and the nose is inevitably involved, the classic symptoms are characterised by sneezing, nasal congestion, itching and the discharge of a thin layer of nasal mucus fluid (rhinorrhea), as outlined in Figure 1.[4]

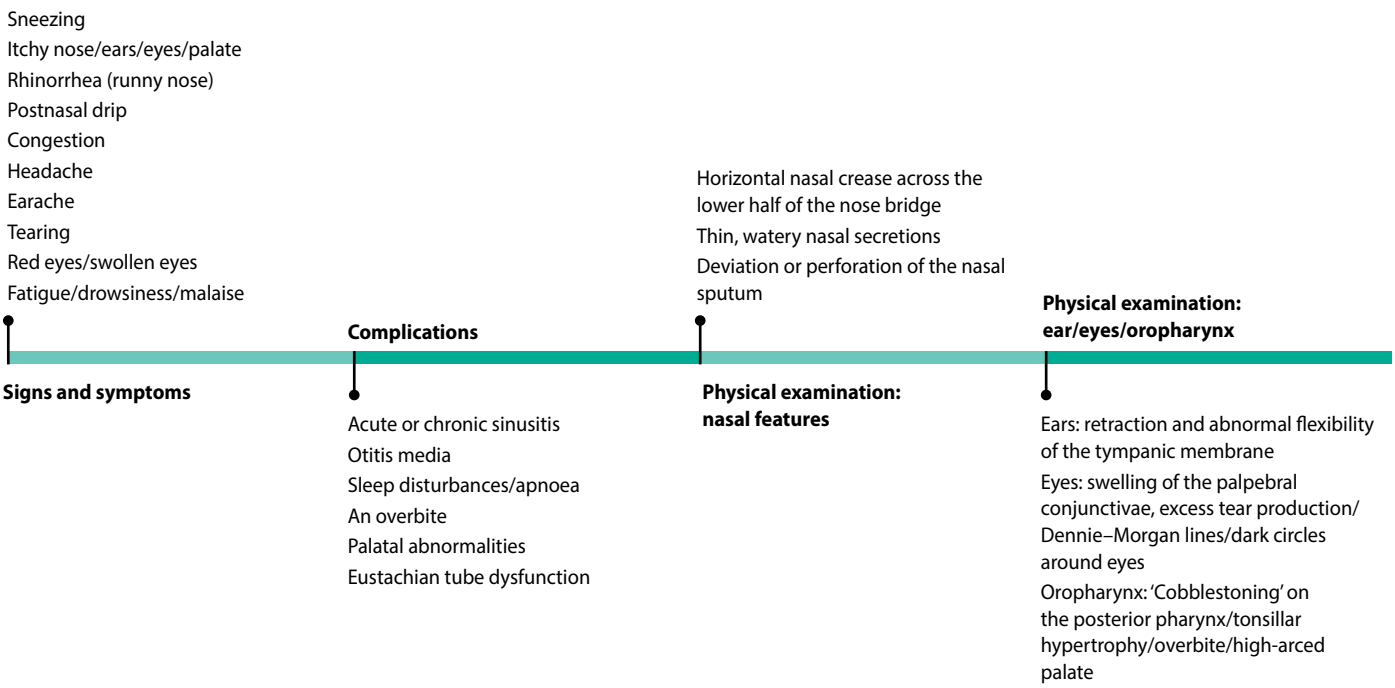

Figure 2: Signs, symptoms and complications of allergic rhinitis[4,5]

Allergic rhinitis is not a life-threatening condition, but due to the involvement of multiple ear, nose and throat (ENT) organs, individual complications may arise, which may contribute to significant impairment of the quality of life (Figure 2).

Management

The main goal in the management of allergic rhinitis is to provide symptomatic relief, and thus the focus should be on three specific categories, namely, the avoidance of allergens and the implementation of environmental control measures, pharmacological treatment and allergen immunotherapy.[4,5]

Allergen avoidance

First-line treatment involves avoiding allergens and irritants.[5] Avoidance strategies may be difficult and/or impractical to implement; however, it effectively improves the management of allergic rhinitis, leading to optimal results when used in combination with pharmacotherapy. Strategies include the avoidance of known or non-specific allergens or irritants that trigger an IgE-mediated response; pollen, dust mites, animals and occupations allergens, as shown in figure 3.[4]

Allergen immunotherapy

Allergen immunotherapy (desensitisation) involves immune-modulating treatment, recommended when pharmacotherapy for allergic rhinitis is ineffective or not well tolerated. Clinical research has established the effectiveness of immunotherapy injections to reduce symptoms, especially in intermittent allergic rhinitis caused by pollen, dust mites, cockroaches and pets. It involves a subcutaneous injection of gradually increasing quantities of the applicable allergen until an effective dose is reached where immunological tolerance is induced.[4,5]

Success rates of up to 90% have been demonstrated for certain allergies. However, it should be reserved for when optimal avoidance measures and pharmacological treatment is insufficient. It's a time-consuming process, with noticeable improvement only showing after 6–12 months, and continuous treatment for up to 3–5 years may be required. Treatment involves weekly injections

Figure 3: Avoidance strategies for allergens and irritants[4]

Pollen	Dust mites	Animals	Occupational	Non-specific
Reduce pollen exposure during the particular season that affects the patient Dry, sunny and windy days have increased pollen counts Keep windows and doors of houses and cars closed if possible Take a shower after outdoor exposure to remove pollen	Cover bedding with impermeable covers Wash covers every 2 weeks in hot water Vacuum clean carpets and rugs if carpeting can't be removed Make use of a dehumidifier and air conditioning	Complete avoidance, although not always practical Alternatively keep animal out of the bedroom and carpeted rooms if possible High-efficiency particulate air (HEPA) filters assist in decreasing cat allergen levels Weekly bathing of pets	Make use of a mask or respirator where needed	Implement reduced exposure or complete avoidance if possible of: Smoke Strong perfumes Fumes Rapid changes in temperature Outdoor pollution

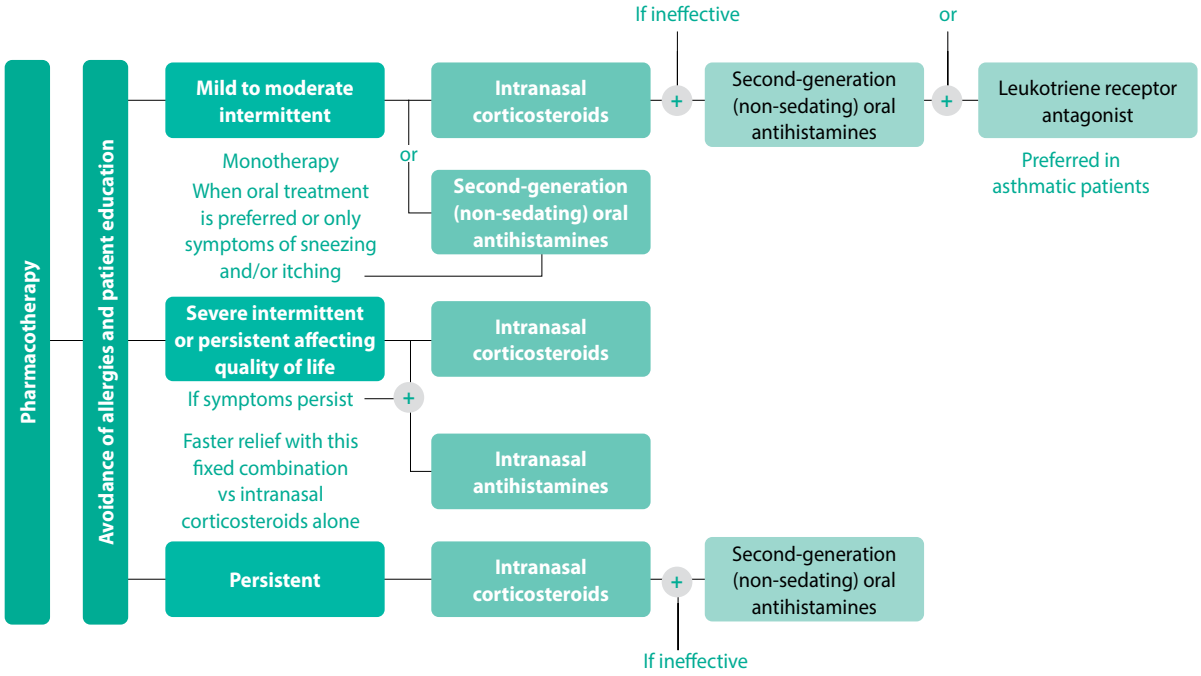

Figure 4: A stepwise algorithm for the pharmacological treatment of allergic rhinitis[8,9]

containing incremental increases of the dose over 6–12 months, followed by maintenance doses of the maximum tolerated dose every 3–4 weeks for 3–5 years. Whereafter the beneficial effects can persist for several years.[4,5]

The FDA has approved several emerging sublingual immunotherapies (SLITs) treatment options, consisting of allergen extracts based on the desensitising of patients. It provides a more convenient treatment option than injections, especially in those with specific allergies, but should also be reserved as a last-line treatment option.[5]

Pharmacological treatment

Allergic rhinitis responds well to pharmacotherapy in the majority of patients. Pharmacotherapy options available include oral antihistamines, intranasal corticosteroids and antihistamines, and leukotriene receptor antagonists. Decongestant sprays and oral decongestant therapy may benefit intermittent allergic rhinitis where the treatment required does not exceed five days. Furthermore, ocular antihistamine drops and a short course of oral corticosteroids in severe, acute episodes may provide better relief.[5]

Treatment guidelines recommend monotherapy, in which intranasal glucocorticosteroids remain the gold standard, especially in severe cases and where the quality of life is affected.[6,7] In the case of combination therapy with an intranasal corticosteroid and an oral antihistamine, monotherapy is recommended as the combination does not provide better results than an intranasal corticosteroid alone.

Oral second-generation antihistamines or intranasal antihistamines are, although to a lesser extent compared to intranasal corticosteroids, effective in the symptomatic treatment of allergic rhinitis in mild to moderate cases, with primarily complaints of sneezing and itching, and in those who prefer oral medication.[6,7] Figure 4 provides a treatment algorithm for the pharmacological treatment of allergic rhinitis.

Local corticosteroids

Intranasal corticosteroids are highly effective in treating allergic rhinitis, particularly in patients with severe symptoms and when congestion is reported.[10-12] They exert their effect by preventing the influx of inflammatory mediators and inhibiting the release of cytokines, thereby reducing inflammation of the nasal mucosa.[10,11] Corticosteroids are thus effective in managing symptoms of allergic rhinitis such as itching, rhinorrhea, nasal congestion and sneezing.[10]

Intranasal corticosteroids are effective as monotherapy; however, they are ineffective against managing ocular symptoms that occur in allergic rhinitis.[12,13] Examples of currently available intranasal corticosteroids include budesonide, beclomethasone, mometasone, fluticasone and ciclesonide (Table II).[11]

Although corticosteroids have a quick onset of action, their peak effect takes several hours or days, and maximum effectiveness is achieved within two to four weeks of use.[12] Local side effects associated with the use of intranasal corticosteroids include nasal dryness, epistaxis and stinging.[8] Long term use of topical corticosteroids can lead to nasal mucosa atrophy, and dosage should be reduced to minimum dose once control of symptoms has been achieved.[8,13]

Due to the common use of nasal sprays and nasal drops, it is important as a pharmacist to ensure that the patient is educated on the correct use of these dosage forms. Figure 5 illustrates proper usage.

Table II: Intranasal corticosteroids currently available[8,10,11]

Intranasal corticosteroid	Mechanism of action	Indication	Adults dose (Drops)	Minimum age	Adverse effects
Budesonide	Inhibit the influx of inflammatory mediators Inhibit the release of cytokines	Maintenance therapy in intermediate allergic rhinitis	1–4 (32 mcg/spray)/nostril once daily	6 years	Bitter aftertaste Epistaxis Burning Stinging Headache Nasal dryness Rhinitis medicamentosa Throat irritation
Beclomethasone		Seasonal allergic rhinitis	1–2 (42 mcg/spray)/nostril twice daily	6 years	
Ciclesonide		Intermittent and persistent allergic rhinitis	1–2 (50 mcg/spray)/nostril once daily	2 years	
Fluticasone furoate		Intermittent and persistent allergic rhinitis	1–2 (50 mcg/spray)/nostril once daily	2 years	
Fluticasone propionate		Prophylaxis and treatment of allergic rhinitis	2 (50 mcg/spray)/nostril once daily	4 years	
Mometasone		Treatment and management of allergic rhinitis	1–2 (50 mcg/spray)/nostril once daily	2 years	
Triamcinolone		Treatment and management of allergic rhinitis	1–2 (55 mcg/spray)/nostril once daily	6 years	

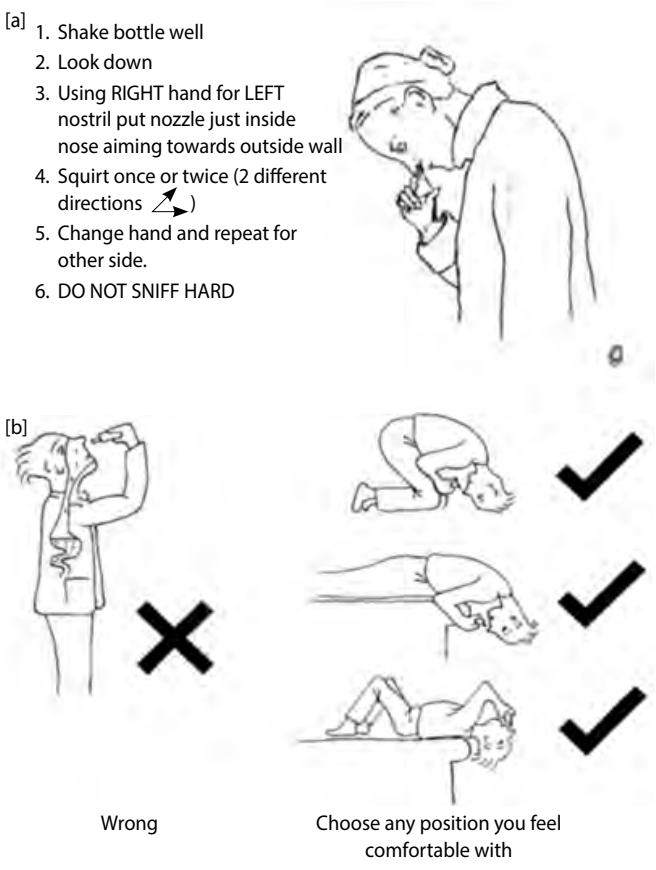

Figure 5: The correct use of a nasal spray or nasal drop[14]

Antihistamines

Following the implementation of allergens and irritants avoidance strategies, second-generation oral antihistamines (desloratadine, fexofenadine, loratadine, cetirizine, levocetirizine and rupatadine) may be used as monotherapy in mild intermittent allergic rhinitis in patients who prefer oral medication or in which the primary complaint is sneezing and itching.[7] Second-generation antihistamines effectively reduce nasal allergic rhinitis symptoms if taken regularly and before exposure to the allergen, without negatively impacting cognitive function as seen in the first-generation antihistamines.[5] Table III shows the recommended dose for adults and paediatric patients.

Table III: Second-generation antihistamines and their recommended dosing[5]

Antihistamine	Adult dosage	Paediatric dosage
Cetirizine	10 mg once daily	2–6 years: 2.5 mg 12-hourly 6–12 years: 5 mg 12-hourly or 10 mg daily
Levocetirizine	5 mg once daily	2–6 years: 1.25 mg 12-hourly 6–12 years: 5 mg once daily
Desloratadine	5 mg once daily	1–5 years: 1.25 mg daily 6–11 years: 2.5 mg daily
Fexofenadine	120 mg once daily	2–11 years: 30 mg 12-hourly
Loratadine	10 mg once daily	2–12 years < 30 kg: 5 mg once daily > 30 kg: 10 mg once daily
Rupatadine	10 mg once daily	2–11 years 10–25kg: 2.5 mg once daily ≥ 25 kg: 5 mg once daily

Intranasal antihistamines

Intranasal antihistamines deliver a rapid, targeted and increased dosage of an antihistamine to the nasal membranes. This treatment option is beneficial even in patients who do not respond to oral therapy. In addition, numerous studies have shown an equality or superiority to oral antihistamines, superiority especially in relieving nasal congestion.[7]

Leukotriene receptor antagonists

Leukotriene receptor inhibits cysteinyl leukotrienes, a potent inflammatory mediator associated with inflammation, nasal congestion, and mucus production that leads to the development of allergic rhinitis symptoms.[10] Examples of leukotriene receptor antagonists (LTRAs) available include montelukast and zafirlukast.

The effectiveness of LTRAs is comparable to that of oral antihistamines but is less effective than intranasal corticosteroids.[8] Although monotherapy with LTRAs has proven to be effective in reducing seasonal allergic rhinitis, combination therapy can be used to manage patients with severe or persistent symptoms.[10,13] A synergistic effect has been reported between LTRAs and antihistamines in the management of seasonal allergic rhinitis.[13] LTRAs are only recommended as first-line treatment for allergic rhinitis in asthmatic patients as they also act as bronchodilators hence managing both conditions.[8,13] They have an oral administration advantage and are usually well-tolerated with rare cases of headaches, rash and abdominal pain.[14]

Other pharmacotherapy

Decongestants, both oral and intranasal, may provide relief of nasal congestions in allergic rhinitis. However, due to their safety profile, treatment should not exceed 3–5 days. Some of the associated side-effects of oral decongestants include agitation, palpitations, high blood pressure and arrhythmias and therefore should not be used in patients with uncontrolled hypertension or severe coronary artery disease.[5] Prolonged use of intranasal decongestants may result in a rebound nasal congestion (rhinitis medicamentosa). In patients with severe refractory allergic rhinitis, oral corticosteroids have also been shown to be effective.[5]

Conclusion

Allergic rhinitis is non-life-threatening, classified as either intermittent or persistent and further divided into mild or moderate to severe based on several individualised factors. Due to the involvement of multiple ENT organs, complications may arise which may impact quality of life. Management options include avoiding allergens and triggers, pharmacotherapeutic agents, and allergen immunotherapy as a last resort.

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