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Review Article

Allergic rhinitis in pediatric age group: a review

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ABSTRACT

Allergic rhinitis (AR) is an important and common chronic disorder in children. It is a worldwide health problem that places a considerable strain on healthcare systems for children and adolescents. AR is a long-term, non-infectious inflammation of the nasal mucous membranes, caused by IgE and triggered by allergen exposure. The development and progression of AR are influenced by the interaction of genetic and environmental factors. Allergic rhinitis significantly affects the pediatric age group, with increasing prevalence and substantial impair the quality of life. The important clinical presentations of AR include rhinorrhea, nasal congestion, sneezing, and itching in the nose and eye. The rising prevalence of allergic rhinitis among pediatric age group underscores the need for a better understanding of these condition in children. Proper assessment of nasal symptoms helps for the most appropriate treatment options to be chosen. Avoidance of allergens is usually difficult to practice daily life. This review addresses the epidemiology, etiopathology, clinical presentations, quality of life, diagnosis, and management of AR in pediatric age group. It seeks to improve the understanding of healthcare providers and families in order to enhance diagnostic accuracy and encourage proper treatment. There is lack of clear national guidelines for AR in pediatric age group, so this illness is often misdiagnosed and mismanaged. This review focuses on the epidemiology, etiopathology, clinical presentations, and current management of AR in pediatric age group.

Keywords: Allergic rhinitis, Pediatric age group, Snoring, Asthma, Intranasal corticosteroids

INTRODUCTION

Allergic rhinitis (AR) is defined as an inflammation of the nasal mucous membranes that characterized by episodes of sneezing, rhinorrhea, and nasal congestion, usually associated with itching in the eyes, nose, palate and throat.[1] Although symptoms of AR may appear mild, their impact should not be underestimated in pediatric age group. AR significantly affect sleep, emotional well-being, cognitive function, and productivity in both study and work environment.[2] There are multiple co-morbidities of AR in children such as sinusitis, asthma, conjunctivitis, eustachian tube dysfunction, and otitis media.[3] AR in children often leads to fatigue, reduced attention span, and impaired learning and memory, which are frequently overlooked by parents.[4] Treatment for AR in children includes oral or intranasal H1 antihistamines, intranasal corticosteroids, environmental control measures, and allergen-specific immunotherapy, all of which have gained significant attention in clinical practice.[5] The present review will attempt to do discuss on epidemiology, etiopathology, clinical presentations, diagnosis, and current treatment of AR in pediatric age group.

METHODS OF LITERATURE SEARCH

A search was conducted for research articles on the allergic rhinitis in pediatric age group using various methods. This began with searching online databases such as Scopus, PubMed, Medline, and Google Scholar. A search strategy was created based on the PRISMA (preferred reporting items for systematic reviews and meta-analysis) guidelines. The search approach found published article abstracts, and citations were used to manually find more research publications. The suitability

of observational studies, comparative studies, case series, case reports, and randomized controlled trials for inclusion in this review was evaluated. A total of 62 articles (23 case reports, 17 case series, and 22 original articles) were found across various databases, with 45 being included in this review (Figure 1). This article discusses the epidemiology, etiopathology, clinical presentations, classifications, quality of life, diagnosis and current treatment of allergic rhinitis in pediatric age group.

Epidemiology

AR has a significant public health concern, affecting children of both developed and developing nations. Epidemiological studies have reported that prevalence of AR increased progressively over the last few decades in developed and industrialized countries globally. AR is affecting up to 40% of worldwide population, with 23 to 30% of the population affected in Europe and 12 to 30% of populations affected in the USA.[6-8] The prevalence of seasonal AR is more in pediatric age group than in adults while perennial rhinitis seems to be higher in adults.[9] AR, especially in developing countries, continues to remain as a neglected disorder.

Many children with AR go completely unnoticed as children usually fail to share their problems at school or home. The prevalence of allergic rhinitis range from 10 to 30% in adults an exceed 40% in children.10 The global rise in allergic rhinitis prevalence mirrors the increasing burden of pediatric allergic diseases, so much so that these conditions are now often referred to as an ‘allergic epidemic’.[11] The increasing prevalence of allergic rhinitis is pediatric age group has emerged as a concern for public health, enhancing the requirement for comprehensive assessment and understanding of its risk factors.

Etiopathology

The identification of exact etiology like genetic and environmental contributions are essential for effective management and preventive measures.[12] The variations in allergic sensitization across ethnic group, suggesting that environmental factors may play an important role than genetic predisposition.[12] When patient of AR is exposed to allergens, allergic reaction occurs in two different types as per time of sequence. One is the early reaction where sneezing and rhinorrhoea develops in few minutes and disappears.

The other is the late reaction, which shows nasal obstruction occur few hours following exposure to allergens and subsides slowly. The early reactions occur due to response of mast cells to offending allergens (type I hypersensitivity). The stimulated mast cells induce nasal symptoms by producing chemical mediators like histamines, prostaglandins and leukotrienes.[13] In contrast to early reaction, eosinophil chemotaxis is the important mechanism in late reaction which is happened by chemical mediators produced in the early reaction. The inflammatory cells, eosinophils, mast cells, and T cells migrate to nasal mucosa, break up and remodel normal nasal tissue and result in nasal obstruction.[13] The hygiene hypothesis proposes that lower exposure to microbes during early part of life increases the likelihood of developing immunoregulatory disease like AR. The passive exposure to cigarette smoking and family history of allergies are well documented contributors to develop allergic rhinitis.[14]

Children's exposure to allergens is the main cause of AR. Dust mites, animal dander, insects, and moulds are indoor allergens, whereas pollen and moulds are outdoor allergens. The idea of "one airway, one disease" is supported by the similarities between the inflammatory processes in the nasal mucosa of AR and the bronchial mucosa of asthma, including pro-inflammatory mediators, adhesion molecules, T helper cell type 2 (Th2) cytokines, and chemokines.[15] According to one study, early childhood AR is a significant predictor of a child's asthma persistence.[16]

Clinical presentations

Although not life-threatening, the clinical presentations of AR are frequently bothersome, adversely affect the work and quality of life of the affected children, and result in burden on both the individual and family. Children with moderate to severe AR may cause nasal obstruction, noisy breathing, sneezing, repeated throat clearing, snoring, and decrease in sense of smell. The prolonged nasal obstruction in children with AR may result in mouth breathing with a gapping mouth, chapped lips, hypertrophied gingival mucosa, elongated face, over-crowded teeth or dental malocclusions, and allergic shiners. Children with AR may also show signs of itching such as an allergic salute or an allergic transverse nasal crease.[17]

There may be malaise and disturbed nocturnal sleep with daytime fatigue among children with AR. The symptoms of AR have potential to result in physical and mental complications, with sleep disturbances, poor learning performance, behaviour, and attention. AR in children is characterized by a constellation of nasal, eye, ear, throat, and palate symptoms. The prominent symptoms (Table1) include itching, sneezing, congestion of the nasal cavities, rhinorrhoea, cough, and postnasal drip.

In addition to localized symptoms, many children with allergic rhinitis also experience more generalized effects such as headache, sleep disturbances, loss of olfaction, and cognitive impairment.[18] Fatigue can be occurred due to disturbed sleep, cognitive impairment and also fatigue associated with effects of proinflammatory mediators on hypothalamus.[18] Chronic nasal blockages can manifest sleep disturbances, such as sleep apnoea and sleep disorders along with fatigue. The systemic effects due to

sleep disturbances include irritability, weakness, malaise, reduced appetite, and poor growth, and poor quality of life.[19] The allergic rhinitis can lead to nocturnal snoring and hypoxia that can affect school performance of a child. Allergy and daytime nasal blockage are independent risk factors for sleep disturbances that affect breathing from habitual snoring to obstructive sleep apnoea.[20] AR in children can cause adenoid hypertrophy, that lead to obstructive sleep apnoea.[21]

The presence of AR in children is significantly associated with higher incidence of otitis media with effusion and hearing loss.[22] Children with AR may manifest delayed speech due to long standing hearing loss due to otitis media with effusion.[23]

The differential diagnosis of AR in pediatric age group includes infectious rhinitis (often viral), foreign bodies in nasal cavity, anatomical variations like unilateral choanal atresia, adenoid hypertrophy, mucociliary dyskinesis, nasal polyps, rhinitis medicamentosa, nasal glioma, benign neoplasms including dermoid cysts and meningoencephalocele, cystic fibrosis and related diseases.[24]

Quality of life

If allergic rhinitis in children left intreated or inadequately managed, it can severely impair the quality of life for both affected children and their family, highlighting its profound impact on children's health.[25] It affect the educational performance, and over well-being of the child. Allergic rhinitis not only affect well-being of children but also imposes financial strain on healthcare systems, with both direct and indirect costs.[26] Children with allergic rhinitis have disturbances in sleep.

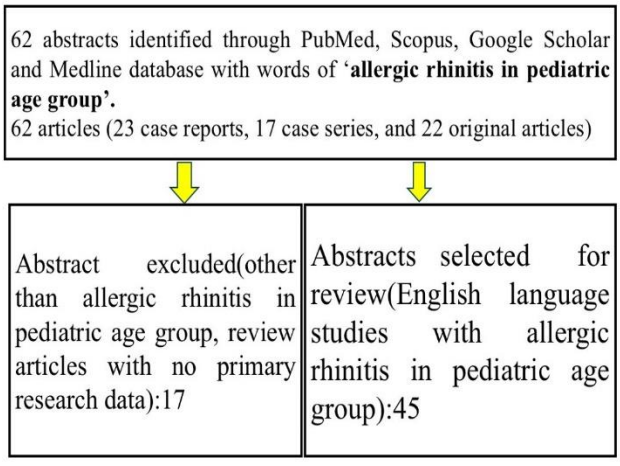

Figure 1: Methods of literature search.

Although the exact cause for sleep disturbance due to allergic rhinitis is not clear, uncontrolled symptoms especially nasal congestion are thought to be responsible. The chronic use of medications may compound the problems.[27] Children with allergic rhinitis have higher prevalence of obstructive sleep apnoea syndrome. Allergic rhinitis in children has a profound impact on daily lives. Allergic rhinitis may result in day time fatigue and impairment of cognition and memory in children, which significantly affect the learning process and so hampers the school performance that upsets the family.[28]

The symptoms of allergic rhinitis like itching in the nose, nasal blockage, sneezing can cause severe distraction during class hours.

The uncontrolled symptoms of allergic rhinitis in children at night time result in sleep disturbance and secondary daytime fatigue also lead to learning impairment. Apart from absenteeism from the routine class, even when present during class time, the child has reduced productivity. The complications of allergic rhinitis can cause sinusitis, eustachian tube dysfunction and associated conductive hearing loss may lead to learning dysfunction.[29]

The irritability, fatigue, distraction, and embarrassment at school among children with allergic rhinitis cause impaired performance in school. The medications like antihistamines used by children with allergic rhinitis can cause side effects like sedations during day time or school hour. The recreational activities of children with allergic rhinitis are often decreased that lead to diminished social interaction and consequent isolation.[30]

Children with allergic rhinitis may have slow speed of cognitive processing and impaired memory during routine activities. The impairment of quality of life among children with allergic rhinitis can happen during the pollen season in case of both seasonal as well as perennial allergic rhinitis. In seasonal variety of allergic rhinitis, quality of life is worse during the pollen season, as comparison to perennial rhinitis.[31]

Table.1: Symptoms of Allergic rhinitis.

Key symptoms	**Sneezing**
	Itching in nose/Nasal pruritus
	Risk factors: Western lifestyle, family history of atopy, decreased exposure to allergens, age less than 20 years
Other common symptoms	Puffy, red or watery eye
	Itching in eye, ear, palate, and throat
	Nasal congestion, nasal crease, hypertrophied nasal turbinates, hypertrophy of nasal mucosa, pale nasal mucosa, clear nasal secretions
	Rhinorrhoea (If unilateral, rule out CSF leak.
	Allergic shiners (dark discoloration below the eyelids) or school

Table.2: Diagnostic criteria of AR in pediatric age group.

Severity of AR	Symptoms of AR
Intermittent	<4 days a week or
	<4 consecutive weeks
Persistent	>4 days a week and
	For >4 consecutive weeks
Mild	None of the following are present
	Sleep disturbance
	Impairment of daily activities, leisure, and/or sport
	Impairment of work or school
Moderate-severe	One or more of the following are present
	Sleep disturbance
	Impairment of daily activities, leisure, and/or sport
	Impairment of work

Classification of AR

AR can be classified into perennial, seasonal, and occupation on the basis of the exposure to aeroallergens. According to ARIA (Allergic rhinitis and its impact on asthma), Both the duration of symptoms (intermittent and persistent rhinitis) and intensity (impaired performance of four health-related quality of life parameters: sleep, daily activities/sport/leisure, job productivity/school performance, and bothersome symptoms) can be used to categorize AR.[32] When none of these are compromised, AR is deemed mild; when one or more of these are impaired, it is deemed moderate or severe. One study stratified moderate/severe into distinct moderate (one to three affected items) and severe (all four affected items) groups, proposing a change to the original ARIA severity classification.[33] The ARIA classification has also been verified for both symptom severity and symptom duration in the pediatric age range.[34] The categorization of AR in the pediatric age group facilitates the development of a suitable treatment plan based on the patient's lifestyle restrictions and the length of their symptoms.[35]

Diagnosis

The diagnosis of AR in children is often challenging as its symptoms usually overlap with those of the upper respiratory tract infections, non-allergic rhinitis. The diagnosis of AR is based on patient history, physical examination, and supported by allergen testing. The investigation of AR is essential because of its potential long-term consequences if not treated adequately. There are few important tests such as nasal allergen challenge, computed tomography (CT) scan, nasal nitric oxide estimation, nasal cytology, nasal culture, and nasal fluid beta transferrin analysis to rule out allergic rhinitis from other types of rhinitis.[36] The commonly used specific tests such as allergen detection tests such as skin prick test, serum specific IgE test, and nasal provocation tests. However, children may not cooperate with skin prick tests. Skin prick test elicits an IgE mediated reaction in the skin that mirrors the mucosal reaction in the nose.[37] This test cannot be used in those who had recently taken antihistamines or patients with dermatographias.[37] If skin prick testing is not possible or provide an unclear result, then the serum-specific IgE level can be done. Although specific IgE estimation is important for diagnosis of allergy, nasal allergen challenge remains the preferred test when the clinical relevance of an allergen requires confirmation.[38] In radioallergosorbent test, the levels of IgE specific antibody in the blood are estimated and ranked, that is used for diagnosis of AR.[39] The diagnostic criteria of AR in pediatric age group is given in Table 2.

Treatment

The approach to managing AR in children focuses on a thorough, step-by-step plan that involves environmental control, medication, immunotherapy, and overall health management.[40] Various strategies include allergen avoidance, patient education, antihistamine therapy, saline nasal irrigation, and targeted immunotherapy. Antihistamines have limited role for controlling the allergic rhinitis caused by house dust mite and other perennial allergens, where symptoms, predominantly nasal block, are not histamine mediated. In contrast, the symptoms of allergic rhinitis triggered by pollen such as itching in the nose, rhinorrhoea and sneezing are relieved by antihistamines.[41]

In moderate to severe cases, combination therapy using corticosteroids and leukotriene receptor antagonist (LTRA) might be needed. Intranasal steroids are the treatment of choice for persistent moderate to severe form of allergic rhinitis and more effective than antihistamines for relieving the nasal obstruction.[41] The ineffectiveness of intranasal medications is often due to poor compliance or incorrect use of nasal sprays. Immunotherapy can be beneficial when symptoms are triggered by a specific pollen. However, the effectiveness of immunotherapy for house dust mite-induced allergic rhinitis and asthma remains a subject of debate. The second antihistamines do not cross blood brain barrier, so less sedatives. In the U.S four second-generation oral antihistamines have been approved for use in children: cetirizine, fexofenadine, loratadine, and its metabolite desloratadine. However, desloratadine is only approved for children over 12 years of age.[42]

The absence of sedative effects is critical for pediatric patients, as allergic rhinitis itself can impair cognition. Cromoglycates are mast cell stabilizers such as intranasal cromolyn that prevent the degranulation and release of mediators from the mast cells.[43] Cromoglycates are considered as the safest medications for treatment of allergic rhinitis in pediatric population and effective for sneezing, rhinorrhoea, and pruritus. For getting maximum effect, cromoglycates should be administered

prophylactically before exposure of allergen and administered every four hours. Corticosteroids are the potent drugs available for the treatment of seasonal and perennial allergic rhinitis. Corticosteroids inhibit the production and release of cytokines, block the IgE-mediated release of mediators from basophils and mast cells, and decrease the recruitment and circulation of proinflammatory cells.[44]

Leukotriene antagonists, like montelukast and zafirlukast, are a newer class of medications used to treat AR, showing proven benefits in patients with bronchial asthma. These antagonists help inhibit the late-phase reaction, providing relief from nasal congestion and ocular symptoms.[45] Sometimes, surgical interventions only considered if AR refractory to medical treatment. Turbinate reduction surgery is effective to relieve the symptoms, but patient should be counselled that it is not a long-term solution. Other surgical options, such as septal and sinus surgery, may also be considered.

CONCLUSION

Allergic rhinitis (AR) is a common chronic disorder in pediatric age group.AR is associated with a number of comorbidities and is strongly linked to the asthma. The symptoms of AR in children have potential physical and mental complications with sleep disordered breathing. It has a significant impact on quality of life of children with negative effect on the learning process. AR greatly impacts life at home, school and even during sleep. Improper treatment of AR in children can compound the problem. There are several treatment options for AR such as avoidance of allergens, patient education, antihistamine therapy, saline nasal irrigation, and immunotherapy.

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REFERENCES

1. Chinratanapisit S, Suratannon N, Pacharn P, Sritipsukho P, Vichyanond P. Prevalence and risk factors of allergic rhinitis in children in Bangkok area. Asian Pac J Allergy Immunol. 2019;37(4):232–9.
2. Meltzer EO, Blaiss MS, Derebery MJ, Mahr TA, Gordon BR, Sheth KK, et al. Burden of allergic rhinitis: results from the Pediatric Allergies in America survey. J Allergy Clin Immunol. 2009;124:43-70.
3. Swain SK, Singh V. Current treatment options for allergic rhinitis: a review. Int J Res Med. Sci. 2023;11(7):2750-5.
4. Schuler IC, Montejo JM. Allergic rhinitis in children and adolescents. Pediatr Clin North Am. 2019;66:981-93.
5. Swain SK, Behera IC, Das A, Mohanty JN. Normal saline nasal irrigation in childhood allergic rhinosinusitis: Our experiences in a tertiary care teaching hospital of Eastern India. Indian Journal of Child Health. 2019;6(6):265-8.
6. Bousquet J, Bodez T, Gehano P, Klossek JM, Liard F, Neukirch F, et al. Allaf B. Implementation of guidelines for allergic rhinitis in specialist practices: a randomized pragmatic controlled trial. International Arch Aller Immunol. 2009 ;150(1):75-82.
7. Bachert C, van Cauwenberge P, Olbrecht J, van Schoor J. Preva lence, classification and perception of allergic and non allergic rhinitis in Belgium. Allergy. 2006;61:693-8.
8. Nathan RA, Meltzer EO, Derebery J, Campbell UB, Stang PE, Corrao MA, et al. The prevalence of nasal symptoms attributed to allergies in the United States: findings from the burden of rhinitis in an America survey. Allergy Asthma Proc. 2008;29:600-8.
9. Jessen M, Malm L. Definition, prevalence and development of nasal obstruction. Allergy. 1997;52(40):3-6.
10. Swain SK. Medical treatment of rhinitis in pregnant woman. Matrix Science Pharma. 2022;6(3):58-61.
11. Beasley R. Worldwide variation in prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema: ISAAC. Lancet. 1998;351(9111):1225-32.
12. Hunninghake GM, Weiss ST, Celedón JC. Asthma in Hispanics. Am J Respir Crit Care Med. 2006;173(2):143-63.
13. Stone KD, Prussin C, Metcalfe DD. IgE, mast cells, basophils, and eosinophils. Journal of Allergy and Clinical Immunology. 2010;125(2):73-80.
14. Wills-Karp M, Santeliz J, Karp CL. The germless theory of allergic disease: revisiting the hygiene hypothesis. Nat Rev Immunol. 2001;1(1):69-75.
15. Bachert C, Vignola AM, Gevaert P, Leynaert B, Van Cauwenberge P, Bousquet J. Allergic rhinitis, rhinosinusitis, and asthma: one airway disease. Immunol Allergy Clin North Am. 2004;24: 19-43.
16. Peat JK, Salome CM, Woolcock AJ. Longitudinal changes in atopy during a 4-year period: relation to bronchial hyperresponsiveness and respiratory symptoms in a population sample of Australian schoolchildren. J Allergy Clin Immunol. 1990;85:65-74.
17. Berger WE. Allergic rhinitis in children: diagnosis and manage ment strategies. Paediatr Drugs. 2004;6:233-50.
18. Dykewicz M, Fineman S. Diagnosis and management of rhinitis: complete guide lines of the Joint Task Force on Practice Parameters in Allergy, Asthma, and Immunology. Ann Allergy Asthma Immunol. 1998; 81: 478-518.
19. Lack G. Pediatric allergic rhinitis and comorbid disorders. J Allergy Clin Immunol. 2001;108(1):9-15.

20. Kaditis AG, Finder J, Alexopoulos EI, Starantzis K, Tanou K, Gampeta S, et al. Sleep-disordered breathing in 3,680 Greek children. Pediatr Pulmonol. 2004;37:499-509.
21. Swain SK. Current medical treatment of obstructive sleep apnoea: A narrative review. Apollo Med. 2024;21(4):363-8.
22. Nguyen LH, Manoukian JJ, Sobol SE, Tewfik TL, Mazer BD, Schloss MD, et al. Hamid QA. Similar allergic inflammation in the middle ear and the upper airway: evidence linking otitis media with effusion to the united airways concept. J Allergy Clin Immunol. 2004;114:1110-5.
23. Swain SK, Dubey D. Current practice for management of otitis media with effusion in children–A review. Medical Journal of Dr. DY Patil University. 2024;17(2):263-8.
24. Steele RW. Rhinosinusitis in children. Curr Allergy Asthma Rep. 2006;6:508-12.
25. Sultész M, Horváth A, Molnár D, Katona G, Mezei G, Hirschberg A, et al. Prevalence of allergic rhinitis, related comorbidities and risk factors in schoolchildren. Allergy Asthma Clin Immunol. 2020;16(1):98.
26. Asher MI, Keil U, Anderson HR, Beasley R, Crane J, Martinez F, et al. International Study of Asthma and Allergies in Childhood (ISAAC): rationale and methods. Eur Respir J. 1995;8(3):483-91.
27. Mansfield LE, Diaz G, Posey CR, Flores-Neder J. Sleep disordered breathing and daytime quality of life in children with allergic rhinitis during treatment with intranasal budesonide. Ann Allergy Asthma Immunol. 2004;92: 240-4.
28. Jáuregui I, Mullol J, Dávila I, Ferrer M, Bartra J, del Cuvillo A, et al. Allergic rhinitis and school performance. J Investig Allergol Clin Immunol. 2009;19(1):32-9.
29. Swain SK, Janardan S, Mohanty JN. Endoscopy guided eustachian tube balloon dilation: Our experiences. Iranian J Otorhinolaryngol. 2020;32(112):287-94.
30. Swain SK. Accessory Ostium of the Maxillary Sinus and Its Impact on Sinusitis. Apollo Medicine. 2024;21(3):250-4.
31. Maksimović N, Janković S, Tomić-Spirić V, Marinković J. Health-related quality of life assessment in patients with allergic rhinitis. Srp Arh Celok Lek. 2005;133:223-8.
32. Bousquet J, Khaltaev N, Cruz AA, Denburg J, Fokkens WJ, Togias A, et al. Allergic rhinitis and its impact on asthma (ARIA) 2008. Allergy. 2008;63:8-160.
33. Valero A, Ferrer M, Baró E, Sastre J, Navarro AM, Martí-Guadaño E, et al. Discrimination between moderate and severe disease may be used in patients with either treated or untreated allergic rhinitis. Allergy. 2010;65(12):1609-13.
34. Montoro J, Del Cuvillo A, Mullol J, Molina X, Bartra J, Dávila I, et al. Validation of the modifiedallergic rhinitis and its impact on asthma (ARIA) severity classification in allergic rhinitis children: the PEDRIAL study. Allergy. 2012;67(11):1437-42.
35. Swain SK, Behera IC, Das A, Mohanty JN. Normal saline nasal irrigation in childhood allergic rhinosinusitis: Our experiences in a tertiary care teaching hospital of Eastern India. Indian Journal of Child Health. 2019;6(6):265-8.
36. Swain SK, Mittal Y. Multidisciplinary Approach to Allergic Fungal Sinusitis: A Scoping Review. Apollo Medicine. 2024;6:09760016241288310.
37. Scadding GK, Kariyawasam HH, Scadding G, Mirakian R, Buckley RJ, Dixon T, et al. BSACI guideline for the diagnosis and management of allergic and non-allergic rhinitis (Revised Edition 2017; 2007). Clinical & Experimental Allergy. 2017;47(7):856-89.
38. Huss-Marp J, Darsow U, Brockow K, Pfab F, Weichenmeier I, Schober W, et al. Can immunoglobulin E-measurement replace challenge tests in allergic rhinoconjunctivitis to grass pollen? Clin Exp Allergy. 2011 41:1116-24.
39. Wang X, Du K, She W, Ouyang Y, Sima Y, Liu C, Zhang L. Recent advances in the diagnosis of allergic rhinitis. Expert review of clinical immunology. 2018;14(11):957-64.
40. Wise SK, Damask C, Greenhawt M, Oppenheimer J, Roland LT, Shaker MS, et al. A synopsis of guidance for allergic rhinitis diagnosis and management from ICAR 2023. J Allergy Clin Immunol Pract. 2023;11:773-96.
41. Turner PJ, Kemp AS. Allergic rhinitis in children. J Paed Child Health. 2012;48(4):302-10.
42. Kreutner W, Hey JA, Anthes J. Preclinical pharmacology of desloratadine, a selective and nonsedating histamine H1 receptor antagonist: 1st communica tion. Receptor selectivity, antihistaminic activity, and antiallergenic effects. Arzneimittel Forsch. 2000;50:345-52.
43. Swain SK. Management of acute invasive fungal sinusitis. Mustansiriya Med J. 2022;21(2):104-10.
44. Holm AF, Fokkens WJ. Topical corticosteroids in allergic rhinitis; effects on nasal inflammatory cells and nasal mucosa. Clin Exp Aller. 2001;31:529-35.
45. Adelsberg J, Philip G, LaForce CF, Weinstein SF, Menten J, Malice MP, et al. Montelukast Spring Rhinitis Investigator Group. Randomized controlled trial evaluating the clinical benefit of montelukast for treating spring seasonal allergic rhinitis. Ann All, Asthma Immunol. 2003;90(2):214-22.

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