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## Original Research Article

## Decoding the role of Loratadine in optimally managing and in alleviating the burden of allergic rhinitis

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## ABSTRACT

Despite an alarmingly rise in prevalence of allergic rhinitis in the last 2 decades, yet till date it remains underdiagnosed, undertreated, or mistreated in India. The distinguishing features of allergic rhinitis are commonly misinterpreted with the common cold and thus early detection of allergic rhinitis is often delayed in primary care. Poorly controlled allergic rhinitis adversely impairs overall long-term productivity at work or school, quality of life (QoL) and can also trigger underlying comorbidities like asthma. Thus, early diagnosis and timely referral is the need of the hour for more effective management which will reduce the overall burden of allergic rhinitis in India.

As allergic rhinitis needs long-term management, it is also paramount to prescribe highly efficacious, cost-effective treatment with minimal side effects like drowsiness to prevent disruption of patient's QoL. However, current therapies including intranasal corticosteroids have adverse long-term complications and antihistamines like cetirizine, levocetirizine, and fexofenadine have varying degrees of sedation.

With these concerns, a management algorithm was developed to aid for early diagnosis in primary care which provides cost effective option of right medication for a proper duration of time to optimize overall patient care. After a thorough discussion of key opinion leaders and evidence-based recommendations, it was highlighted that loratadine deserves to be considered as a first-line antihistamine therapy due to its rapid and long-lasting symptom relief, non drowsy, and low complication rate for long-term management of allergic rhinitis.

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## 1. Introduction

Allergic rhinitis is one of the most common allergic diseases widely affecting 40% of the general population worldwide.<sup>1</sup> Almost 600 million suffer from allergic rhinitis globally.<sup>2</sup> It is estimated that nearly 150 million are patients of allergic rhinitis in the Asia-Pacific region.<sup>3</sup> Reported incidence of allergic rhinitis in India ranges between 20% and 30%.<sup>4</sup> It is estimated that the prevalence of allergic rhinitis in India has alarmingly increased in the last 2 decades.<sup>5</sup>

Allergic rhinitis begins during the first few years of life but can have a lasting impact throughout life due to adverse long-term complications.<sup>1,6</sup> A recent Indian study observed a high prevalence of allergic rhinitis (52.1%) more frequently in 2<sup>nd</sup> decade of life, reflecting that children and young adults are the most affected group. Notably, allergic rhinitis is also a common chronic disorder in the pediatric population with up to 40% of children being affected.<sup>6</sup> Allergic rhinitis is also related to severe morbidity, accounting for over 2 million lost school days, 6 million lost work days and 28 million of workdays per year restricted worldwide.<sup>7</sup>

Studies have shown that the prevalence of allergic rhinitis has been increasing in India over the past few years due to increased industrialization, lifestyle changes, environmental exposures, seasonal variations, and immune disruption during and after the post-COVID-19 pandemic era. However, allergic rhinitis is frequently neglected, underdiagnosed, misdiagnosed, and undertreated, which is detrimental to a patient's health and has high economic costs. Poorly controlled symptoms of allergic rhinitis may contribute to decreased overall long-term productivity at work or school and impaired quality of life (QoL). Additionally, poorly controlled allergic rhinitis may also trigger underlying comorbidities like sinusitis, upper respiratory infections, otitis media, atopic dermatitis, and asthma.<sup>4,8–10</sup>

Allergic rhinitis is one of the top ten reasons for a visit to primary care physicians.<sup>6</sup> For patients suffering from mild-moderate allergic rhinitis, primary care physicians are often their first source to seek medical opinion. Primary health care is an important source of health information for patients, as many patients choose treatment related to their health based on a recommendation from a trusted source, such as general practitioners (GPs) or pharmacists. Furthermore, primary care physicians play a crucial role in educating their patients on preventing diseases and treating simple ailments at home. However, at times the diagnosis is delayed by primary care physicians due to overlapping features of allergic rhinitis and common cold.<sup>1</sup> Thus, it is crucial to develop a management algorithm that will act as guidance in primary care for early diagnosis and treatment of allergic rhinitis by distinguishing it

from other pathologies/ailments like the common cold and by providing cost effective management option of right medication along with the right molecule for a proper duration of time to optimize overall patient care. Likewise, early diagnosis will not only help initiate timely management but will also guide the primary care physician on when to refer a patient to the specialist. Overall, early diagnosis and timely referral will eventually aid in more effective management and control which will finally contribute to bringing down the overall burden of allergic rhinitis in India.<sup>1</sup>

## 2. Materials and Methods

We conducted a nationwide advisory board meeting attended by ENT key opinion leaders (KOLs) to determine their clinical viewpoint on alleviating the burden of allergic rhinitis in the Indian scenario. An in-depth evidence-based search of PubMed studies emphasizing on various aspects of allergic rhinitis relevant to the Indian scenario was presented to these KOLs who shared their perspectives based on their clinical experiences associated with allergic rhinitis. Relevant questions were also framed to seek the opinions of KOLs for bridging the clinical gap between evidence-based research and current Indian clinical practices in allergic rhinitis.

## 3. Results

Relevant aspects of allergic rhinitis with support of PubMed literature and clinical evidence were presented to KOLs who discussed and provided their consensus associated with allergic rhinitis.

### 3.1. Prevalence of allergic rhinitis in India

All KOLs agreed with respect to the increased prevalence of allergic rhinitis due to lifestyle changes, environmental exposures, seasonal variations, and immune disruption during and after the post-COVID-19 pandemic in India. During the COVID-19 pandemic, people being confined to their houses has led to more exposure to house mites and cleaning activities thus causing a high incidence of allergic rhinitis cases in India.

Likewise, post-COVID-19 has also shown an upsurge trend of allergic rhinitis cases due to school resumption without a mandate on mask usage and low immunity in children leading to a high propensity to allergic cough due to infections. All KOLs also conceded that an upsurge of allergic rhinitis cases has also led to a parallel increase in other allergic conditions like atopic dermatitis and asthma in the Indian population.<sup>1,10,11</sup>

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### 3.2. Triggers of allergic rhinitis in India: The changing landscape

Allergic rhinitis is frequently caused by exposure to perennial or seasonal allergens present in the indoor and outdoor environment.<sup>4</sup> A research initiative for self-care equity (RISE) survey was conducted in which a total of 28 relevant studies from 18 unique countries were finalized for data extraction in allergic disorders. The Indian findings from the RISE survey have demonstrated time-based progress of allergic rhinitis due to indoor environmental risk factors like the condition of indoor air that is worsened by using fuel for cooking or heating, condition/surfaces of furniture and buildings. Moreover, physical environment, (urban residence), individual-level risk factors (family history of allergy and asthma, smoking), socioeconomic factors (education, income, employment status), and other determinants (ethnicity, stress, BMI) can also trigger allergic rhinitis. If exposed to a greater number of irritants, the at-risk population who become more prone to allergic rhinitis are:<sup>10,11</sup>

1. People born to mothers with unhealthy habits before and during pregnancy
2. People born to mothers with low level of education
3. Young children and elderly
4. People with family history
5. People born into big families with lots of siblings
6. Living in area with poor air quality/housing conditions

In India, allergic rhinitis is present throughout the year (as a form of perennial rhinitis) but can be triggered in all seasons due to high pollen count in summer, extended or low rainfall, and cold winters. High environmental air pollution, and smoke/ gas irritants in India are also critical factors for causing allergic rhinitis. Air pollution significantly influences the diagnostic prevalence of allergic rhinitis, especially with exposure to high NO<sub>2</sub> levels (NO<sub>2</sub> is the by-product of fuel burning). Rising air pollutants not only trigger allergic rhinitis, but nearly 3 million people per year die from unhealthy indoor air exposure. A study conducted in Asia reported that strong associations exist between daily concentration of three air pollutants (sulfur oxide, nitrous oxide, particulate matter with aerodynamic diameter of  $\leq 10 \mu\text{m}$ ) and the daily number of adult outpatients reporting allergic rhinitis symptoms. These correlations indicate that an increasing amount of these air pollutants had short-term effects on children and adults with allergic rhinitis such as exacerbating symptoms and increasing hospital visits. Another study involving pediatric population, reported that that the risk of allergic rhinitis is significantly associated with increasing level of sulfur dioxide, carbon monoxide and nitrogen oxides. A recent study has highlighted that long term exposure to air pollution is associated with an increase severity score of rhinitis in allergic rhinitis patients. Several studies have shown that air pollution

can influence both the amount of pollen produced by the plant and the amount of allergenic proteins contained in pollen grains. It was reported that pollen of plants stressed by polluted air expresses enhanced levels of allergenic proteins. Notably, indoor and outdoor exposures to aeroallergens and air pollutants, and environmental factors induce inflammatory responses in the upper and lower airways with the recruitment of inflammatory cells, cytokines, and interleukins. Worldwide, India has one of the highest concentrations of air pollution caused by biomass, fossil fuels, and vehicular exhausts. Likewise, the use of mosquito coils and incense/dhoop sticks are also considered to be causative factors of indoor pollution.<sup>10–12</sup>

Nearly all KOLs conceded that in their daily clinical practice there has been an upsurge of Indian patients with exacerbated symptoms of allergic rhinitis due to air pollution, the bursting of crackers leading to smoke in festivities, and during seasonal variations. Thus, the prevention of possible triggers by patient counselling was highlighted as a crucial point by all KOLs for the effective management of allergic rhinitis.

The post-COVID-19 era has led to unique clinical challenges by reducing the body's immunity and increasing susceptibility to more intermittent allergic rhinitis cases due to increased travel leading to increased vehicular traffic on weekends. In the post-COVID-19 era, there has also been an increase in resistance to the treatment of allergic rhinitis as patients do not respond in the first week of initial therapy. As noted above, there has been a dramatic increase in overall healthcare costs during the post-COVID-19 era, thus needing more cost-effective therapies for optimal long-term management of allergic rhinitis.<sup>1,10,11</sup>

### 3.3. Burden & adverse consequences of allergic rhinitis across the life Span

Allergic rhinitis carries a serious clinical burden, as a high number of patients have insufficient symptom control which significantly impacts their quality of life. On the other hand, patients with allergic rhinitis often underestimate the severity of their symptoms and tend to trivialize their disease by initially approaching the chemist, then the GP, and then the ENT specialist. Results from the Asia-Pacific burden of respiratory diseases study which was more specifically conducted in Indian patients showed that the most frequently diagnosed combinations were asthma/allergic rhinitis and rhinosinusitis/allergic rhinitis.<sup>1,13</sup>

All KOLs agreed to the fact that poorly controlled symptoms of allergic rhinitis may contribute to sleep loss, secondary daytime fatigue, learning impairment, emotional disorders, family/social behavioural problems, mouth breathing problems, loss of productivity, and decreased quality of life. Additionally, poorly controlled allergic rhinitis may also initiate the development and aggravation of comorbidities including chronic rhinosinusitis, sleep

apnea, otitis media, atopic dermatitis, aggravation of underlying asthma, and increased propensity to develop upper respiratory infections, and conjunctivitis.<sup>9,14</sup>

### 3.4. Impact of allergic rhinitis on QoL

A cross-sectional study evidence assessed the QoL among 120 Indian patients with allergic rhinitis regardless of their age and gender using nocturnal rhino-conjunctivitis quality of life questionnaire (NRQLQ). The NRQLQ score showed that the most affected domain in patients were “practical problems” (3.97) namely, ‘have to avoid symptom triggers’, ‘need to rub nose or eyes’ & ‘have to take medication’. The second most affected domain was “symptoms on waking in the morning” (3.61), namely ‘feel tired & unrefreshed’, ‘nasal congestion or stuffy nose’, ‘congestion in the sinuses, and ‘takes time to clear night-time drainage after waking up.<sup>15</sup> all the KOLs conceded that allergic rhinitis had a serious impact on the patient’s QoL.

### 3.5. Impact of allergic rhinitis on work productivity

Decreased productivity is evidenced in patients who suffer from moderate or severe rhinitis because of specific rhinitis symptoms in their workplace or school and disturbances in sleep. Notably, the prescription of sedative antihistamines shows the highest adverse influence on work productivity.<sup>16</sup> In a study of 422 adults with rhinitis, moderate to severe seasonal allergic rhinitis symptoms were responsible for 35% to 40% impairment of normal productivity at work.<sup>17</sup> Allergic rhinitis symptoms can affect driving ability and in the case of aviation pilots, can also cause otalgia due to barotrauma, changes in vision, and cabin distractions.<sup>18</sup> All the KOLs conceded on the importance and need of a non-drowsy therapy for allergic rhinitis, as opposed to a molecule with side effect of drowsiness which will further worsen the ‘day time’ work productivity and hence adversely impact the patient’s QoL.

Almost 2 million lost school days, 6 million lost work days and 28 million of workdays per year are restricted due to allergic rhinitis worldwide.<sup>7</sup> Children with allergic rhinitis may have school problems including absences and poor performance caused by distraction, fatigue, or irritability. Children may also have problems at school because of a learning impairment or may be unable to participate in individual or family activities such as playing sports on grass, playing with pets, and camping trips that will probably elicit allergic symptoms.<sup>17</sup>

A cross-sectional cohort study conducted on 105 patients showed that productivity losses due to allergic rhinitis were also associated with the severity of depressed mood rather than classic nasal or extra-nasal symptoms.<sup>19</sup> In addition, children may have an emotional disturbance as a result of an inability to fully integrate with their peers and they may feel isolated, leading to frustration, sadness, and anger.<sup>17</sup>

### 3.6. Impact of allergic rhinitis on sleep

Rhinorrhea and congestion are the symptoms associated with allergic rhinitis that affect sleep the most; thereby decreasing productivity at work, sports, and school. Moreover, allergic patients with nasal congestion had a 1.8 times greater chance of moderate-to-severe sleep-disordered breathing than those without congestion. All KOLs agreed to the fact that early and appropriate treatment for managing allergic rhinitis symptoms will likely decrease sleep disturbances and subsequently lessen daytime fatigue, thereby improving QoL.<sup>20</sup>

### 3.7. Economic impact of allergic rhinitis

Allergic rhinitis is associated with substantial incremental increases in healthcare utilization and expenditures due to increases in OPD visits and prescription expenditures. The socioeconomic burden of allergic rhinitis is on the patient’s QoL, work performance, and daily activities. Ghosal *et al.*, noted a cost of \$ 637 per patient per annum in respiratory disorders. Out of which 62.2% was due to a lack of productivity. Likewise, the highest direct cost was due to medications which contribute 61.1% of the total cost. Thus, the loss of work productivity cost was observed to be much higher than the actual cost of medications.<sup>13,21</sup>

Compelling evidence suggests that treatment of allergic rhinitis is sub-optimal in India due to the unaffordability of patients to buy medications which impacts treatment adherence.<sup>5</sup> On the other hand, many patients having persistent allergic rhinitis require prolonged or even life-long use of antihistaminic agents, putting them under a great economic burden.<sup>22</sup> On the other hand, intranasal corticosteroids commonly prescribed by GPs are not preferred in long term management of allergic rhinitis as they are both expensive as well as associated with many long-term adverse consequences.<sup>23,24</sup>

As noted above, all KOLs agreed that suboptimal management of allergic rhinitis occurs due to patients’ unaffordability to buy medications which makes them discontinue the required long-term treatment. This consequently leads to an alarming rise in the incidence rates of allergic rhinitis and parallelly imposes an enormous burden on Indian patients and the healthcare sector.

Management of allergic rhinitis is dynamic and the COVID-19 pandemic has also added unique challenges to this landscape. Post-COVID-19, the overall cost of medicines, consultations, and healthcare has exponentially increased. Hence, cost-effective management options for allergic rhinitis are preferred and optimal management is the need of the hour in the post-COVID-19 era.<sup>1</sup> Nearly all KOLs agreed that allergic rhinitis needs long-term therapy and hence cost-effective or affordable therapy is crucial for appropriate patient adherence which will lead to optimal management of allergic rhinitis in India. Moreover,

all the KOLs emphasized that a non-drowsy/ less drowsy management therapy option is needed to minimise or prevent work productivity getting hampered in patients of allergic rhinitis.

### 3.8. Loratadine: First line antihistamine therapy for optimal management of Allergic Rhinitis

Second-generation antihistamines are commonly the first line of therapy in allergic rhinitis and should essentially be a cost-effective treatment and have good long efficacy, rapid onset of action, and freedom from side effects.<sup>25</sup> Loratadine, a second-generation nonsedating antihistamine is widely used and is clinically proven to be effective, and associated with long-term safety for managing allergic rhinitis.<sup>26</sup> Nagarajan *et. al.*, conducted a cost analysis study in the year 2022 which showed that loratadine is also a much more cost-effective antihistamine than fexofenadine and bilastine in India.<sup>27</sup>

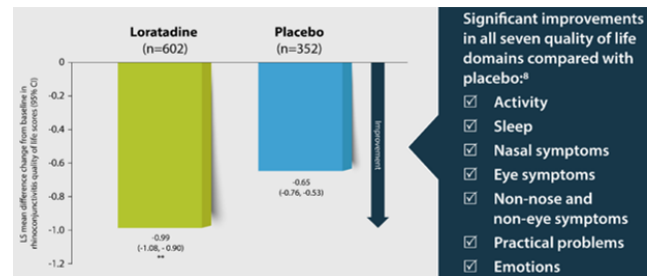
It is clinically proven that loratadine achieves rapid onset of action associated with long-term duration for at least 24 hours.<sup>28</sup> A double-blind and parallel-group study showed that the early onset of action of loratadine (10 mg/20 mg once a day) offers prompt relief of allergy symptoms without the need for a loading dose. Compelling evidence suggests that the mean onset of symptom relief with loratadine is approximately 27 minutes and complete relief within 45 minutes.<sup>29</sup>

### 3.9. Clinical efficacy of loratadine in the management of Allergic Rhinitis

Bruttman *et.al.*, study showed that 63% of patients treated with loratadine (10 mg/day) achieved a good or excellent response as compared to 26% of patients on placebo in perennial allergic rhinitis. Moreover, symptom improvement with loratadine was observed at the end of the first week of treatment, and improvement was greater during the next 3 weeks. This continued efficacy was important as it suggested that the patients did not develop tolerance to loratadine during the 28-day course of treatment.<sup>30</sup> Philip *et. al.*, study showed significant improvement in all seven domains of rhino conjunctivitis QoL score after two weeks of loratadine treatment than with placebo (Figure 1). Further, daytime (-0.24) and night-time nasal symptoms (-0.09) scores showed marked improvement from baseline during treatment with loratadine ( $p \leq 0.001$  vs. placebo). Mean changes from baseline in all other diary-based scores, including night-time and eye symptom scores, were also significantly greater for loratadine than for placebo.<sup>31</sup>

Compelling evidence suggests that loratadine can withstand ragweed pollen challenge of the very high level of pollen concentration ( $3500 \pm 500$  grains/m<sup>3</sup>).<sup>32</sup> Notably, as loratadine is practically void of sedative effects and has no impact on driving ability it can be safely be prescribed to

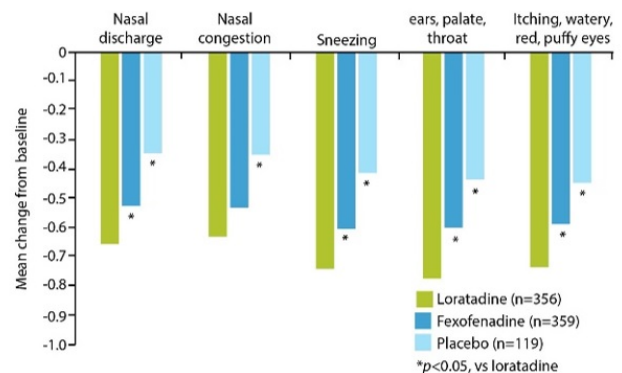
astronauts and pilots.<sup>33</sup> A study evaluated the cardiac safety of loratadine in the treatment of perennial allergic rhinitis in 40 elderly patients who had a history of cardiovascular diseases and/or presented abnormal ECG parameters, but had no prolonged QT-interval. These subjects received loratadine 10 mg/day for 30 days. A series of baseline ECG recordings was obtained before treatment and ECG effects of the treatments were then compared with the baseline ECGs. The study results showed no changes in sinus rhythm in all the elderly patients 30 days after treatment by loratadine. This study concluded that the usual recommended dose of loratadine is not associated with cardiotoxicity during long-term treatment of allergic rhinitis in the elderly.<sup>34</sup>



**Fig. 1:** Seven domains of rhinoconjunctivitis QoL score after two weeks of loratadine vs placebo in allergic rhinitis

### 3.10. Comparative efficacy of loratadine in the management of Allergic Rhinitis

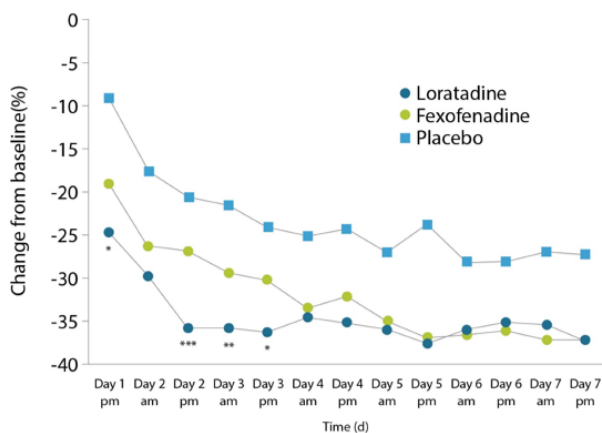
A double-blind comparative study of seasonal rhinitis showed similar improved scores but high rates of somnolence in 9.5% of patients treated with cetirizine vs. 3.6% of patients with loratadine.<sup>35</sup>



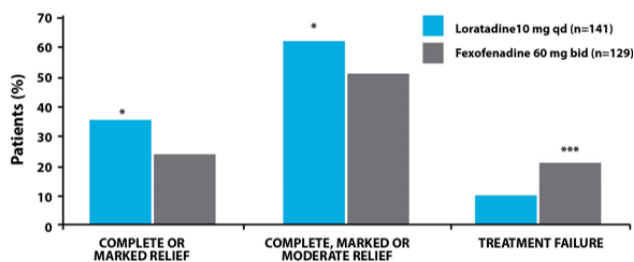
**Fig. 2:** Average daily reflective symptom score at day 2 with loaratadine vs. fexofenadine in allergic rhinitis

Another randomized and double-blind study compared loratadine 10 mg/day with fexofenadine 60 mg twice daily

and placebo for 7 days in 835 patients with seasonal allergic rhinitis. Greater improvements in individual symptoms were achieved with loratadine as compared with fexofenadine. By day 2, mean reductions in nasal discharge; sneezing; itching nose, ears, palate, and throat; and itchy, watery, red, puffy eyes were significantly greater with loratadine than with fexofenadine ( $p \leq 0.017$ ) (Figure 2). Loratadine demonstrated a significant reduction from baseline in total symptom severity scores (TSS) than with fexofenadine ( $-24.5\%$  for loratadine vs  $-19\%$  for fexofenadine,  $p = 0.023$ ). Loratadine also showed significantly greater ( $p < 0.05$  for each) symptomatic relief compared with fexofenadine at four of the five assessments during the first 3 days of treatment (day 1 pm, day 2 pm, and day 3 am and pm) (Figure 3). This study concluded that loratadine achieved a greater degree of early symptom relief (in the first 3 days of treatment) along with maximum treatment efficacy for managing allergic rhinitis.<sup>35</sup>



**Fig. 3:** Percentage change from baseline in am and pm mean reflective TSS with loratadine vs fexofenadine (\*  $p < 0.025$ ; \*\*  $p < 0.014$ ; \*\*\*  $p < 0.001$ ) in allergic rhinitis



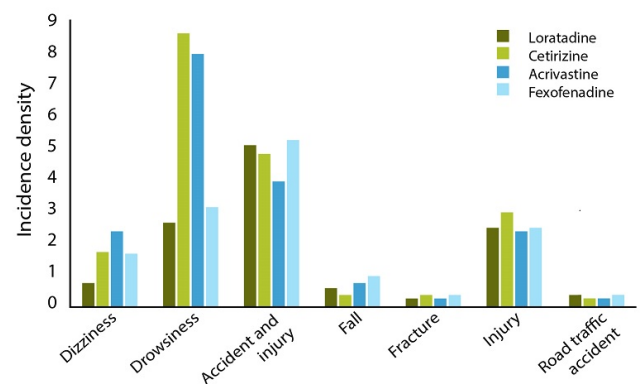
**Fig. 4:** Therapeutic response and treatment failure with loratadine vs. fexofenadine in allergic rhinitis

Another double-blind and randomized study compared the therapeutic responses to loratadine 10 mg once daily and fexofenadine 60 mg twice daily in patients who failed initial therapy with the other drug. Complete, marked,

or moderate relief of symptoms was observed in 62.4% after switching to loratadine vs. only 51.2% of patients experienced symptom relief after switching to fexofenadine ( $p = 0.005$ ). Significantly more nonresponders experienced complete or marked relief after switching to loratadine than after switching to fexofenadine (35.5% and 24.8%, respectively;  $p = 0.04$ ). Further, the failure rate was twice as high after fexofenadine than after loratadine (21.7% and 10.6%, respectively;  $p = 0.011$ ) (Figure 4). A greater decrease in patient and investigator ratings of symptom severity was observed for loratadine than for fexofenadine ( $-3.4$  vs  $-3.1$  and  $-10.7$  vs  $-8.3$ , respectively). The most frequent adverse event, irrespective of relationship to treatment, was a headache, which occurred in 8.8% of fexofenadine-treated patients and 4.2% of loratadine-treated patients. Overall, loratadine provided a significantly better therapeutic response than fexofenadine in patients who failed to respond to initial therapy with the other drug.<sup>36</sup>

### 3.11. Comparative safety of loratadine in the management of Allergic Rhinitis

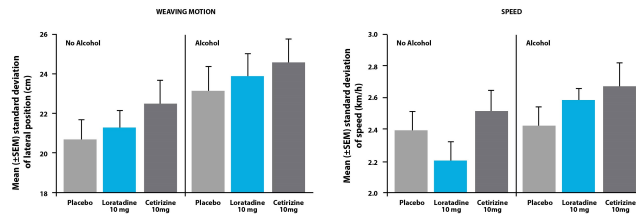
A double-blind and placebo-controlled study investigating the effects of fexofenadine, loratadine, and promethazine on cognitive and psychomotor function showed that loratadine subjects felt alert and there was a lack of CNS effects following a 10 mg dose of this drug.<sup>37</sup> Mann *et. al.*, study showed that loratadine and fexofenadine are preferable drugs due to the least side effects than cetirizine and acrivastine (Figure 5). In this study, the adjusted odds ratios suggested that cetirizine was 3.5 times more likely and acrivastine 2.8 times more likely to result in reports of sedation than loratadine.<sup>38</sup>



**Fig. 5:** Most commonly reported adverse events in first month of treatment with various antihistamines

Compelling evidence suggests that cetirizine and levocetirizine may still induce sedation-like effects, despite being selective for peripheral H<sub>1</sub> receptors.<sup>39</sup> A randomized and double-blind study showed that sedation, as measured by both the modified Epworth sleepiness scale ( $p = 0.52$ )

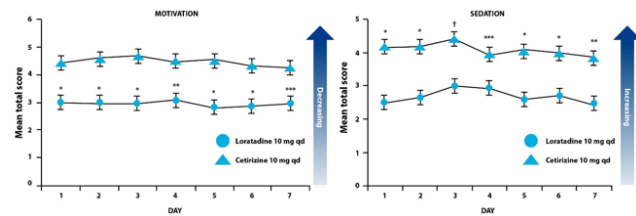
and the Likert scale ( $p = 0.42$ ), were not significantly different between levocetirizine and cetirizine treatments in patients with perennial allergic rhinitis.<sup>40</sup> Ramaekers *et. al.*, study showed that the effects of cetirizine of on driving performance resembled those.



**Fig. 6:** Mean (SEM) standard deviation of lateral position and speed after administration of loratadine and cetirizine with and without alcohol

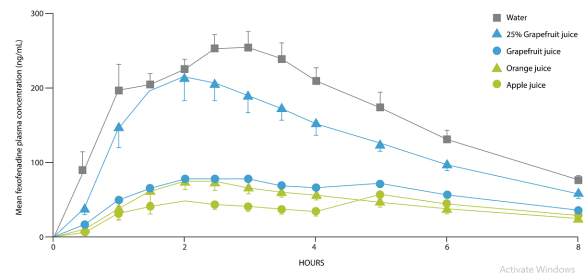
The recommended dose of cetirizine was sedating and impairing which caused the subjects to operate with significantly greater variability in speed and lateral position. On the other hand, loratadine 10 mg had no significant impact on the ability to drive and on psychometric performance (Figure 6).<sup>41</sup>

A parallel-group, double-blind study compared the somnolence and motivation profiles of loratadine 10 mg and cetirizine 10 mg in patients with allergic rhinitis. The study outcomes showed a significant difference in somnolence scores between the loratadine and cetirizine groups at 10:00 AM ( $p = 0.008$ ), noon ( $p = 0.001$ ), and 3:00 PM ( $p < 0.001$ ), with the cetirizine group showing a greater degree of somnolence. In parallel with the somnolence scores, there were significant differences in motivation scores between the loratadine and cetirizine groups at 10:00 AM ( $p = 0.014$ ), noon ( $p = 0.001$ ), and 3:00 PM ( $p < 0.001$ ), indicating that patients taking loratadine were relatively more motivated during the workday (Figure 7). In short, cetirizine use promoted somnolence and decreased motivation to perform activities during the workday as compared with loratadine.<sup>42</sup>



**Fig. 7:** Comparative mean scores of motivation and sedation of loratadine vs. cetirizine

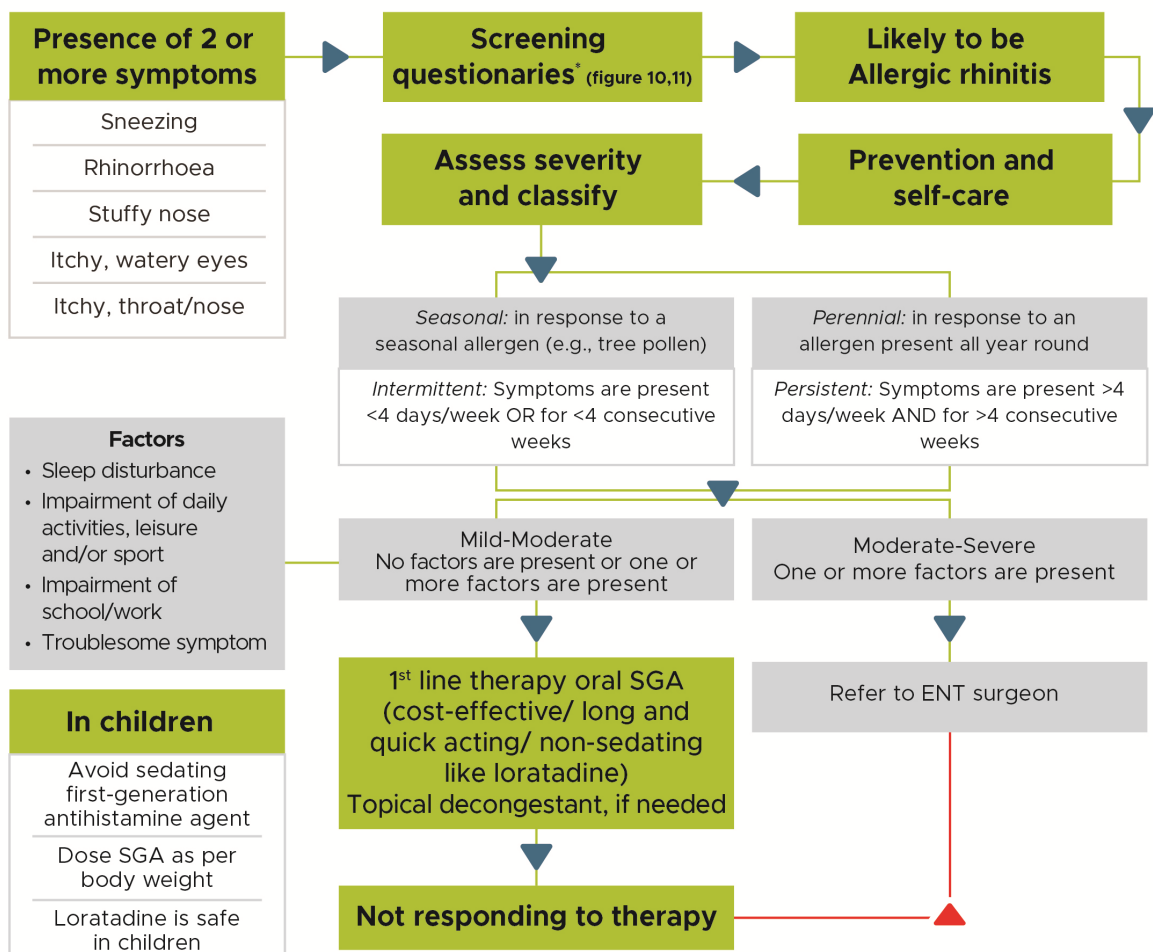
Food–drug interactions are also important to be considered since certain antihistamines such as fexofenadine interact with acidic fruit juices and with antacids, especially those containing aluminum and magnesium oxide. Grapefruit, orange, and apple juices decrease the bioavailability of fexofenadine by reducing its area under the plasma concentration–time curve (AUC), the peak plasma drug concentration ( $C_{max}$ ), and the urinary excretion values to 30% to 40% of those with water in humans (Figure 8).<sup>43</sup> Similarly, antacids especially containing aluminum and magnesium oxide when administered along with fexofenadine can reduce its bioavailability.<sup>44</sup> Unlike fexofenadine, another distinct feature of loratadine is that it can be safely taken with fruit juices or with antacids especially containing aluminum and magnesium oxide without having any impact on its bioavailability.<sup>45</sup>



**Fig. 8:** Impact on the bioavailability of fexofenadine with acidic fruit juices

All the KOLs supported all the clinical evidence and conceded to the point that loratadine is a cost-effective antihistamine therapy due to its high efficacy, least sedative effect along with low complications as compared to fexofenadine, cetirizine, levocetirizine or other antihistamines. Loratadine can be taken any time of the day (no restriction on the time of use) as compared to cetirizine/ levocetirizine which need to be typically restricted in the evening/ night since they cause sedation as a side effect. All KOLs agreed to the fact that loratadine is the first line of management in more than 80% of patients due to its fast onset of action, longer duration, ease of use, cost-effectiveness, and once-daily dosing which can enhance treatment adherence in the long-term management of allergic rhinitis.

Aid to differentiate and diagnose Allergic rhinitis and Common cold		
	Allergic rhinitis	Common cold
Runny nose	Often (Profuse anterior Rhinorrhea)	Always ( Anterior and posterior rhinorrhea)
Sneezing	Very Common	Common
Stuffy nose	Always present	Common
Nasal pruritus	Very common	No
Nasal pain	No	Sometimes
Ocular itch	Common	No
Ocular redness	Yes	No
Cough	Sometimes, if associated with asthma	Common
Wheezing	Sometimes, if associated with asthma	Not present
Sore throat	Rarely	Common



**Fig. 9:** Diagnosis and treatment algorithm for Allergic Rhinitis in primary care



### Screening Questionnaire\*

1a. Have you ever experienced any of the following symptoms for atleast >1 hour	
Runny nose (Rhinorrhea)	Yes <input type="checkbox"/> No <input type="checkbox"/>
Sneezing	Yes <input type="checkbox"/> No <input type="checkbox"/>
Stuffy nose	Yes <input type="checkbox"/> No <input type="checkbox"/>
Conjunctivitis (red and itchy eyes)	Yes <input type="checkbox"/> No <input type="checkbox"/>
Itchy nose	Yes <input type="checkbox"/> No <input type="checkbox"/>
1b. Have you ever been diagnosed with hay fever, allergic rhinitis or asthma?	
Yes <input type="checkbox"/> No <input type="checkbox"/>	
1c. Have you ever been experiencing shortness of breath or wheezing? (Indicative of asthma)	
Yes <input type="checkbox"/> No <input type="checkbox"/>	
1d. Do you suspect your symptoms are caused by a trigger such as pollen, pets or contact with something at home or work?	
Yes <input type="checkbox"/> No <input type="checkbox"/>	
1e. Do you have sleep disturbances (easily wakeup, don't sleep well) or difficulty falling asleep?	
Yes <input type="checkbox"/> No <input type="checkbox"/>	
1f. Do you often feel tired or sleepy when studying or working?	
Yes <input type="checkbox"/> No <input type="checkbox"/>	
<i>If you answered yes to most of the questions above, proceed to Questions 2 and 3</i>	
2. How often and for how long do you feel the symptom(s)?	
3. Are the symptoms persistent (i.e if you experience it >4 days/week and >4 weeks) or intermittent (i.e you experience it <4 days/week or <= 4Weeks)?	
Persistent <input type="checkbox"/>	
Intermittent <input type="checkbox"/>	

### Exclusion list

4. Do you have any of the following symptoms?	
Symptoms only occur on one side of the nose	Yes <input type="checkbox"/> No <input type="checkbox"/>
Thick, green or yellow nasal discharge	Yes <input type="checkbox"/> No <input type="checkbox"/>
Postnasal drip (feeling in the back of the throat) with thick mucus and/or a runny nose	Yes <input type="checkbox"/> No <input type="checkbox"/>
Pain in the ears or face	Yes <input type="checkbox"/> No <input type="checkbox"/>
Repeated nosebleeds	Yes <input type="checkbox"/> No <input type="checkbox"/>
Loss of smell	Yes <input type="checkbox"/> No <input type="checkbox"/>
Dry and burning eyes	Yes <input type="checkbox"/> No <input type="checkbox"/>
Photophobia (eye discomfort in bright light)	Yes <input type="checkbox"/> No <input type="checkbox"/>

Fig. 10: Screening questionnaire

**For primary care provider use**

**Questions 1a-1f** - If the answer is mostly “yes” it is likely allergic rhinitis and can be given therapy according to severity level

**Questions 2 & 3** - To assess the frequency and severity of the disease

**Question 4** - If the answer is mostly “yes” it is probably NOT allergic rhinitis and needs to be referred to a specialist for further diagnosis

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**Fig. 11:**

### 3.12. Clinical challenges of managing allergic rhinitis in children

In school-age children, the impact of sedation on learning ability is of great concern. Uncontrolled allergic rhinitis impairs children’s learning ability and affects their behavioural and psychosocial development. Taste-masking of bitter drugs in liquid formulations significantly improves treatment compliance and outcome in children. The use of sedating antihistamines further affects cognitive and psychomotor performance, and rapid eye movement sleeps, and may also cause a paradoxical effect where children become hyperactive instead due to sleep deprivation. However, loratadine is a non-sedating second-generation antihistamine that has demonstrated effectiveness in managing allergic rhinitis in children.<sup>39</sup>

### 3.13. Clinical management of allergic rhinitis in primary care

Allergic rhinitis needs long-term management and thus choosing a cost-effective treatment and patient counselling via patient education and awareness is critical for ensuring treatment adherence. If patients with allergic rhinitis adhere to their treatments, they will avoid the long-term complications of allergic rhinitis which will ultimately reduce the cost of further therapy.<sup>46</sup>

It is vital for primary care physicians to do an early diagnosis and treatment of allergic rhinitis by distinguishing it from other pathologies/ailments like the common cold and by providing cost effective management option of right medication along with the right molecule for a proper duration of time to optimize overall patient care. Early diagnosis and timely referral by primary care physician will eventually aid in more effective management and control of allergic rhinitis.<sup>1</sup>

All KOLs agreed on a clinical algorithm for primary care physicians (general practitioners) by differentiating allergic rhinitis from the common cold and by providing treatment strategies based on clinical features and severity of allergic rhinitis (Figures 9, 10 and 11 ). However, all primary care physicians need to have clarity as to when they should refer the patient to an ENT specialist.<sup>47-49</sup>

### 3.14. Preventive/self-care management of allergic rhinitis

Self-management—including symptom monitoring, allergen avoidance, and adhering to a treatment plan—is the mainstay of management for allergic rhinitis in the real world. Allergen reduction or avoidance measures have been widely utilized and individual patients may benefit from them. Depending on the specific allergen involved, small lifestyle adjustments can also bring about a real improvement in the lives of sufferers. Simple allergen avoidance advice includes:<sup>50,51</sup>

1. *Grass pollen allergen*: Pollen counts are at their highest in the early morning, evening, and night, so avoiding grassy open spaces at these times may be helpful. Closing windows in houses and cars when pollen counts are high is also prudent and many modern cars have pollen filters which should be changed regularly.
2. *Confirmed house dust mite allergy*: Try house dust mite avoidance measures, mattresses and pillows can be fitted with house dust mite impermeable covers; synthetic pillows and acrylic duvets should be used in preference to other materials, and furry soft toys should be removed from beds. Bedding and furry toys should be washed once a week at high temperatures (60° C or above). In bedrooms, wooden or hard floor

surfaces are preferable to carpets, and blinds with surfaces that can be wiped are preferable to curtains. Regular dust removal from bedroom surfaces should be carried out with a damp cloth. Even if these measures are diligently applied it can take some time for any improvement in symptoms to be apparent.

3. *Confirmed animal allergy*: Avoidance of animals and of surfaces likely to be contaminated with fur and dander are obvious measures. When symptoms are severe it may be best to restrict animals to rooms not frequented by the sufferer.

#### 4. Conclusion

Although there is a rising prevalence of allergic rhinitis, it remains underdiagnosed, undertreated, or mistreated in India. The distinguishing features of allergic rhinitis are commonly misunderstood with the common cold and thus early detection of allergic rhinitis is often delayed in primary care. However, due to the dynamic nature of allergic rhinitis management, interaction with primary care physicians is very essential. Early diagnosis will not only help initiate timely management but will also guide the primary care physician on when to refer a patient to the specialist. Overall, early diagnosis and timely referral will eventually aid in more effective management and control which will finally contribute to bringing down the overall burden of allergic rhinitis in India.

As allergic rhinitis needs long-term management, it is paramount to prescribe highly efficacious, cost-effective treatment option with minimal side effects like drowsiness to prevent disruption of patient's QoL along with clinically proven long-term safety to ensure patient adherence. Although intranasal corticosteroids are commonly used by primary care physicians, they are associated with adverse long-term complications. Likewise, antihistamines like cetirizine, levocetirizine, and fexofenadine are associated with varying degrees of sedation and other adverse complications.

On the other hand, loratadine deserves to be considered as a first-line antihistamine therapy due to its rapid and long-lasting symptom relief, non drowsy, and low complication rate for long-term management of allergic rhinitis. In essence, understanding the patient profiles and selecting the appropriate treatment strategy based on factors such as age, symptoms, severity, patient preferences, cost, and individual circumstances is the ultimate key to optimal allergic rhinitis management.

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#### 6. Conflict of Interest

None.

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