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Original Research Article

Evaluation of efficacy and safety of bilastine 20 mg tablets in adult patients with allergic rhinitis

Samir Bhargava[1]*, Karthikeyan Padmanabhan[2], Chidananda Ramappa[3]

[1]Bhargava Nursing Home, Santacruz (W), Mumbai, Maharashtra, India
[2]Mahatma Gandhi Medical College and Research Institute, Puducherry, India
[3]Medstar Speciality Hospital, Bangalore, Karnataka, India

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***Correspondence:**
Dr. Samir Bhargava,
E-mail: drsamirbhargava@yahoo.co.in

ABSTRACT

Background: Bilastine is a nonsedating, H1-antihistamine used for symptomatic treatment of allergic rhinitis; However, data on its efficacy and safety in Indian patients with allergic rhinitis are lacking.
Methods: In this multicenter, single-arm, investigator-initiated study, 90 patients with allergic rhinitis received bilastine 20 mg tablets once daily for 4 weeks. The primary endpoint was change in total symptom score (TSS=nasal symptom score [NSS] + non-nasal symptom score [NNSS]) at day 28 from baseline. Severity of individual nasal and non-nasal symptoms was assessed at baseline, day 7, and day 28 by rating each symptom on a scale of 0-3. Key secondary endpoints were incidence of treatment-emergent adverse events (TEAEs), changes in NSS, NNSS, and rhinoconjunctivitis quality of life questionnaire (RQLQ) score, and from baseline to days 7 and 28, and change in Stanford sleepiness scale (SSS) score from baseline to 2 hours post-first dose.
Results: The mean allergic rhinitis symptom scores TSS, NSS and NNSS showed a significant decrease ($p<0.0001$) at each visit compared with baseline. A statistically significant decline ($p<0.0001$) in the mean RQLQ score was observed at days 7 and 28 versus baseline. Median SSS score was 1.0 (range: 1.0-7.0) before and after the 1st dose of bilastine, indicating that it did not cause sedation. No TEAEs were reported during the study.
Conclusions: Bilastine 20 mg once daily was efficacious in reducing nasal and non-nasal allergic symptoms, was well tolerated, and had a good safety profile in patients with allergic rhinitis.

Keywords: Bilastine, Allergic rhinitis, NNSS, NSS, ROLQ

INTRODUCTION

Allergic rhinitis is an inflammation of the nasal mucosa that causes elicitation of an immune response to immunoglobulin E (Ig-E) mediated inflammation by production of immune mediators like histamines.[1]

The prevalence of allergic diseases, including asthma, rhinitis, anaphylaxis, or food, drug, or insect allergy, is rising worldwide. Over 400 million people suffer from allergic rhinitis around the world, which to a large extent remains underdiagnosed and undertreated.[2] The reported incidence of allergic rhinitis in the western countries is 1.4%-39.7%. Reported incidence of allergic rhinitis in India ranges between 20% and 30%. Seasonal rhinitis is more prevalent among children, while adults are more affected by perennial rhinitis.[3] The prevalence of allergic rhinitis in Indian children is reported to be between 11.0%-24.0%.[4]

Clinically, allergic rhinitis is characterized by four key symptoms, namely, anterior or posterior rhinorrhea, sneezing, nasal itching, and nasal congestion. These symptoms disrupt sleep, cause fatigue and depression, compromise cognitive function, and lower quality of life (QoL), all of which affect performance at work and

productivity.[5] Causal agents of allergic rhinitis include molds, pollen, dust mites, and animal dander, that deposit on the mucosal membrane of the nose. Subsequent exposure of the nasal mucosa to the specific antigen/allergen for which the individual has been sensitized produces the allergic rhinitis response.[6]

Allergic rhinitis is a heterogeneous disorder that frequently goes undiagnosed because patients fail to recognize the gravity of its impact on QoL and functioning due to prolonged symptoms that go undetected at initial stage. As a result, medical advice is sought late or not at all.[7,8] Treatment for allergic rhinitis aims at reducing or eliminating its symptoms. Various pharmacological options available for the treatment of allergic rhinitis include intranasal corticosteroids, oral and intranasal antihistamines, decongestants, intranasal cromolyn, intranasal anticholinergics, and leukotriene receptor antagonists.[9]

The most common adverse effects of intranasal corticosteroids are throat irritation, epistaxis, stinging, burning, and nasal dryness.[10,11] First generation oral histamines may cause sedation, fatigue, and impaired mental status. Intranasal antihistamines cause bitter aftertaste, headache, nasal irritation, epistaxis, and sedation.[12]

Common adverse effects of intranasal decongestants are sneezing and nasal dryness. Use for more than three to five days is usually not recommended because patients may develop rhinitis medicamentosa or may have rebound or recurring congestion.[10,13]

Oral H_1 antihistamines help improve symptoms and QoL of patients with allergic rhinitis, but second-generation antihistamines are preferred for their favorable safety profile and nonsedative properties. Commonly used second-generation antihistamines include bilastine, fexofenadine, cetirizine, levocetirizine, loratadine, desloratadine, and ebastine.[14]

Bilastine is a second-generation antihistamine, with rapid onset (30 minutes-1 hour) and sustained duration of action (~26 hours).[15-20]

It is administered orally once daily and is rapidly absorbed after oral administration, achieving maximum plasma concentrations after 1.0-1.5 hours.[15,18,21] As it does not undergo hepatic metabolism, bilastine does not have any drug-drug interactions. It usually does not cross the blood–brain barrier and thus has fewer sedative effects.

An important advantage of bilastine is that it has a very favorable tolerability profile with minimal effect on sedation, psychomotor performance and driving competence.[22] Unlike cetirizine, bilastine does not augment the central nervous system (CNS) effects of alcohol.[23] In addition to not being nonsedative, bilastine is not associated with weight gain, anticholinergic effects, or cardiac side effects.[24] Bilastine has the highest number of positive attributes of such agents using the criteria defined by guidelines of the Dermatology Section of the European Academy of Allergology and Clinical Immunology, EU-founded network of excellence, Global Allergy and Asthma European Network, European Dermatology Forum and the World Allergy Organization.[25]

A randomized trial assessing the efficacy of bilastine 20 mg once daily for 2 weeks in Japanese perennial allergic rhinitis patients found that it was effective and had good tolerability and exhibited a rapid onset of action.[26] Bilastine was found to be superior to placebo but comparable with other oral antihistamines (OAHs) in improving rhinitis symptoms, nasal symptoms, and QoL. Somnolence was observed to be notably less with bilastine as compared with other OAHs.[27]

In the current study, various rhinitis parameters along with QoL and safety were assessed following treatment with once daily bilastine 20 mg tablets over a period of 4 weeks in Indian patients with allergic rhinitis. The sedative effect of the drug 2 hours post-dose was also assessed.

METHODS

Study design

This was a prospective, single -arm, investigator-initiated study in adult patients with allergic rhinitis conducted at 3 centers in India (Bhargava nursing home surgical and general hospital, Santacruz, Mumbai; Mahatma Gandhi medical college and research institute, Puducherry; and Medstar speciality hospital, Bangalore) from March 2021 to February 2022. Ninety patients were included in the study. The institutional ethics committee of the study site examined the clinical study protocol and other study-related documents. Every patient provided written informed consent before participation in the trial. Each eligible patient received one Bilazest (bilastine 20 mg) tablet per day for 4 weeks.

Eligibility criteria

Male and female patients aged 18-60 years with a clinical history of allergic rhinitis and presenting with symptoms of allergic rhinitis, but who were not taking any medications for at least 2 weeks prior to the start of the study, were included.

Patients with nasal polyps and deviation of the nasal septum or significant nasal tract structural malformation, patients with a history of alcohol, drug abuse, and tobacco use, or smoking, patients with nonallergic rhinitis and a history of intranasal or eye surgeries within 3 months of study start, and patients who had taken H1 or H2 antihistamines within 3 days to 1 week prior to the

start of the study or those with acute or chronic sinusitis within 30 days of starting the study were excluded. Patients with hypersensitivity to bilastine or antihistamines, imidazoles, or lactose were also excluded. Patients taking corticosteroids during the last 4 weeks, loratadine or desloratadine during the last 10 days, anti-leukotrienes or ketotifen during the last 2 weeks, macrolides, imidazole, anticholinergics or decongestants during the last 3 days, or immunotherapy within 2 years (other than stable maintenance dose for 1 month) before entry into the study; any CNS-acting agents including antidepressants, sedatives, anxiolytics, hypnotics, opioids or neuroleptics at any time were also excluded.

Study endpoints

The primary endpoint was change in TSS, calculated as sum of NSS and non-nasal symptom score (NNSS), from baseline to day 28. Secondary endpoints were 1) incidence of TEAEs, 2) changes in rhinoconjunctivitis QoL questionnaire (RQLQ) score from baseline to days 7 and 28, 3) change in NSS and NNSS from baseline to day 7, 4) change in SSS score from baseline to 2 hours post-first dose, and 5) changes in liver enzymes, kidney function, and echocardiogram from baseline to day 28.[27]

Study assessments

Patients' demographic data, medical/surgical history, medication history and present medical conditions were documented during screening. The TSS was calculated as the sum of scores for 4 nasal symptoms (NSS: rhinorrhea, congestion, itching, and sneezing) and 3 non-nasal symptoms (NNSS: tearing, redness, and itching). Each symptom was scored at baseline and study visits as 0 for absence of symptoms, 1 for presence of mild but not troublesome symptoms, 2 for moderate frequently present and annoying symptoms, or 3 for severe, continuously present symptoms interfering with activities or sleep.

The RQLQ consists of 28 questions in 7 domains such as activity limitation, sleep problems, nasal symptoms, eye symptoms, non-nose/eye symptoms, practical issues, and emotional function. Patients asked to recall as to how bothered they by their rhino-conjunctivitis during previous week and to respond to each question on 7-point scale as 0=not impaired at all to 6=severely impaired.

The SSS allows respondents to indicate their level of sleepiness on a scale from 1 to 7.[28]

During the study period, all AEs were recorded and observed until resolution. An AE was defined as any unexpected or unfavorable medical occurrence, including any abnormal sign (e.g., abnormal physical exam or laboratory finding), symptom, or disease, temporally related to the participants' involvement in the research, whether considered related to participation in research, including concurrent illnesses/ injuries and exacerbation of pre-existing conditions. Hematology, biochemistry (liver enzymes and kidney function tests), and urinalysis performed both before and after study treatment.

Statistical analysis

To detect a paired difference of 3.22 for the mean TSS, assuming a standard deviation of paired differences of 3.3 and using a paired t test with a 5% two-sided significance level, a sample of 30 subjects per site (30×4=120 subjects) would have greater than 99% power to detect a significant difference between pre-dose and day 28. As one center dropped from the study due to unavoidable reasons on 07 October 2021, sample size reduced to 90.

The intent-to-treat (ITT) set comprised all patients who received at least one dose of the study treatment and had at least one post-baseline assessment. The per protocol (PP) set comprised of all patients who received at least one dose of the study treatment and who did not have any major protocol deviations. Safety set comprised of all patients who received at least one dose of the study treatment. All categorical variables were summarized as frequency and percentages. All continuous variables were summarized as n, mean, and standard deviation (SD). R software version 4.0.3 was used for analysis.

The changes in TSS, NSS, NNSS, and RQLQ scores from baseline to days 7 or 28 were estimated using repeated measures analysis of variance (ANOVA). The point estimate of the change was presented along with 95% confidence interval. The p values were based on the mixed model for repeated measures (MMRM). Paired t test was used for analyzing change in SSS pre- and 2 hours post-first dose.

RESULTS

Patient demographics and baseline characteristics

Of 90 screened patients, all 90 satisfied the eligibility criteria and were enrolled in the study and included in the ITT set. Of these, 84 patients completed study (Figure 1).

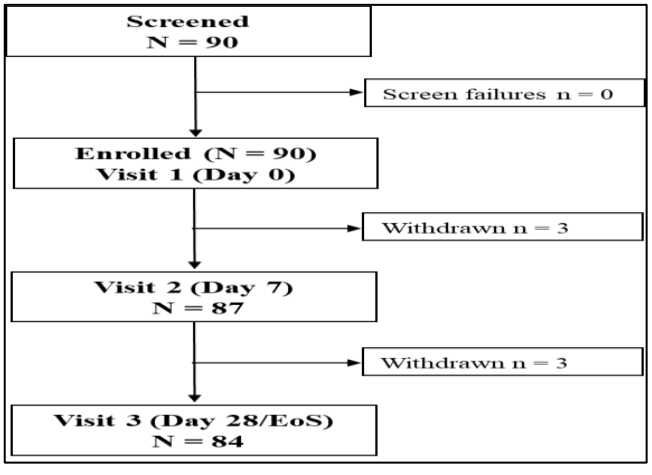

Figure 1: Patient disposition.

Out of 90 enrolled patients, 7 patients had major protocol deviations and were excluded from the PP set. Mean (SD) age of patients was 34.07 (10.06) years and 34.02 (10.31) years in the ITT and PP sets, respectively (Table 1).

Table 1: Patient demographics.

Characteristics	ITT population, (n=90) (%)	PP population, (n=83) (%)
Age (Years), mean (SD)	34.07 (10.06)	34.02 (10.31)
Female sex	49 (54.4)	45 (54.2)
History of alcohol consumption	0 (0.0)	0 (0.0)
History of smoking	0 (0.0)	0 (0.0)
History of tobacco/ substance abuse	0 (0.0)	0 (0.0)

ITT, intend to treat PP, per protocol; SD, standard deviation.

Efficacy of once daily bilastine following 4 weeks of treatment

Change in TSS

Mean (SD) TSS for ITT population decreased from 10.7 (2.66) at baseline to 7 (3.88) at day 7 and to 5.3 (4) at day 28. Thus, mean (SD) change in TSS from baseline -3.7 (4.16) and -5.4 (5.83) at days 7 and 28, respectively. At both post-baseline visits, there was statistically significant decrease in mean TSS (p<0.0001; Figure 2).

Mean (SD) TSS for PP population decreased from 10.8 (2.61) at baseline to 7.6 (3.48) at day 7 and to 5.5 (4.01) at day 28. Thus, mean (SD) change in TSS from baseline -3.3 (4.00) and -5.4 (5.94) at days 7 and 28, respectively. A statistically significant decrease in mean TSS from baseline (p<0.0001) observed at both post-baseline visits.

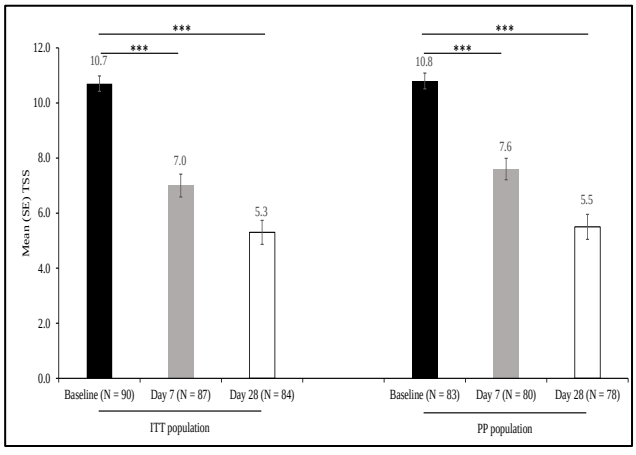

Figure 2: Change in TSS for allergic rhinitis from baseline to day 28.

ITT-intent to treat; MMRM-mixed model repeated measures; PP-per protocol; SE-standard error; TSS-total symptom score, *** indicates p<0.0001 based on MMRM model with change in the endpoint as the dependent variable and visit as fixed effect.

Change in NSS and NNSS

Mean (SD) NSS for ITT population decreased from 7.2 (2.67) at baseline to 4.5 (2.82) at day 7 and 3.2 (2.01) at day 28. Thus, mean (SD) change in NSS from baseline was -2.7 (3.72) and -4.1 (4.36) at days 7 and 28, respectively. At both post-baseline visits, a statistically significant decline in NSS seen (p<0.0001; (Figure 3A).

Mean (SD) NNSS for ITT population decreased from 3.5 (1.60) at baseline to 2.5 (1.85) at day 7 and then marginally to 2.2 (2.22) at day 28. Thus, mean (SD) change in NNSS from baseline was -0.99 (1.33) and -1.3 (1.91) at days 7 and 28, respectively. At both visits, there was statistically significant decrease in NNSS from baseline (p<0.0001; Figure 3B).

For the PP population, mean (SD) NSS significantly decreased (p<0.0001) from 7.1 (2.74) at baseline to 4.9 (2.64) at day 7 and to 3.2 (1.93) at day 28. Thus, mean (SD) change in NNSS from baseline-2.3 (3.56) and 4.0 (4.42) at days 7 and 28 resp. At both visits statistically significant decline in NSS from baseline seen (Figure 3A).

Similarly, mean (SD) NNSS of 3.7 (1.45) at baseline also significantly (p<0.0001) reduced to 2.7 (1.77) at day 7 and to 2.4 (2.22) day 28, with mean (SD) change of -0.98 (1.33) and-1.4 (1.97) at days 7 and 28, resp (Figure 3B).

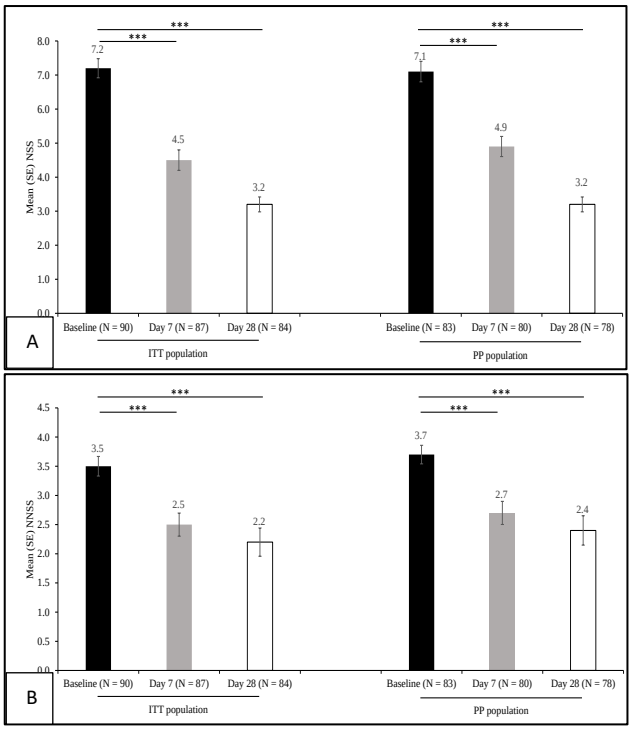

Figure 3 (A and B): Change in NSS and NNSS for allergic rhinitis from baseline to day 28.

ITT, intent to treat; MMRM, mixed model repeated measures; NSS, nasal symptoms score; NNSS, non-nasal symptoms score; PP, per protocol; SE, standard error;*** indicates p<0.0001

based on the MMRM model with change in the endpoint as the dependent variable and visit as a fixed effect.

Effect of bilastine on QoL

The mean (SD) RQLQ score for the ITT population was 2.17 (0.89) at baseline, which was significantly ($p<0.0001$) reduced to 1.44 (1.01) at day 7 and 0.92 (0.88) at day 28.

Similar change was observed for the PP population, where the mean (SD) baseline RQLQ score of 2.27 (0.86) significantly ($p<0.0001$) decreased to 1.56 (0.95) at day 7 and 0.98 (0.89) at day 28 (Figure 4).

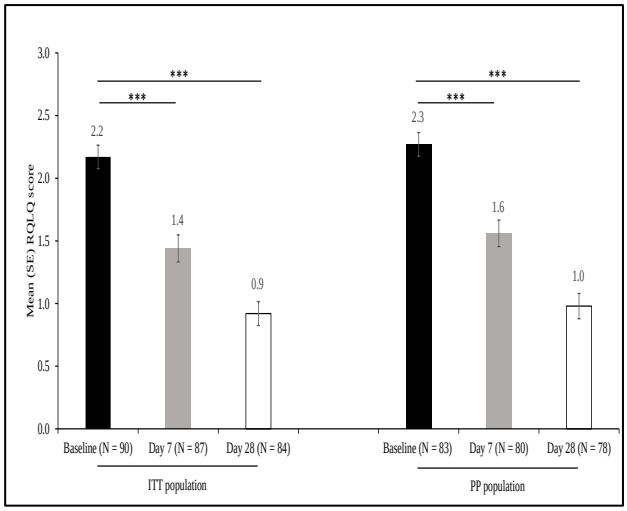

Figure 4: Change in RQLQ scores from baseline to day 28.

ITT-intent to treat; MMRM-mixed model repeated measures; PP-per protocol; RQLQ-rhino-conjunctivitis quality of life questionnaire; SE-standard error; *** indicates $p<0.0001$ based on the MMRM model with change in the endpoint as the dependent variable and visit as a fixed effect.

Effect of bilastine on sedation

In the ITT population, 55.6% patients had an SSS score of 1 (active, alert, and awake) at baseline, and they continued to have SSS score of 1 at 2 hours after 1st dose administration. The remaining 44.4% patients had baseline SSS score of ≥5, and they continued to remain in the same scores category (≥5) at 2 hours after 1st dose administration (Table 2). Moreover, the median (range) SSS score was 1.0 (1.0-7.0) before and 2 hours after dosing, indicating that it did not cause any further sedation.

Similar trends were observed in the PP population (Table 2).

Safety of bilastine

No AEs were reported during the study.

Minor changes were observed in liver enzymes and kidney function tests, which were not found to be clinically significant (Table 3).

Table 2: Summary of SSS by category and visit.

SSS	ITT population (n=90) (%)		PP population (n=83) (%)	
	Pre-dose	2 hours post-dose	Pre-dose	2 hours post-dose
1	50 (55.6)	50 (55.6)	43 (51.8)	43 (51.8)
5	14 (15.6)	5 (5.6)	14 (16.9)	5 (6.02)
6	20 (22.2)	22 (24.4)	20 (24.1)	22 (26.51)
7	6 (6.7)	13 (14.4)	6 (7.23)	13 (15.66)

ITT-intent to treat; MMRM-mixed model repeated measures; PP-per protocol; SSS-Stanford sleepiness score.

Table 3: Change in liver enzymes and kidney function tests from baseline to day 28-safety population.

Parameter, mean (SD)	Baseline safety population, (n=83) (%)	Day 28 safety population, (n=78) (%)	Change from baseline safety population (n=78) (%)
SGOT (U/L)	38.22 (21.89)	34.73 (16.73)	-4.28 (17.35)
SGPT (U/L)	37.64 (20.37)	35.94 (18.31)	-2.62 (15.19)
Serum albumin (g/dL)	4.29 (0.71)	4.30 (1.08)	0.00 (1.23)
Serum alkaline phosphate (U/L)	78.39 (19.66)	79.60 (20.48)	1.74 (13.25)
Total bilirubin (mg/dL)	0.48 (0.20)	0.47 (0.27)	-0.02 (0.26)
Direct bilirubin (mg/dL)	0.18 (0.07)	0.17 (0.08)	-0.01 (0.10)

SD-standard deviation; SGOT-serum glutamic-oxaloacetic transaminase, SGPT-serum glutamic pyruvic transaminase.

DISCUSSION

In this open-label, multicenter, investigator-initiated study in Indian patients with allergic rhinitis, significant decrease in allergic rhinitis symptoms was seen after the treatment with bilastine 20 mg once daily for 28 days. A statistically significant decrease from baseline was observed in TSS ($p<0.0001$; primary endpoint), NSS, and NNSS at 7 and 28 days post-once daily dosing. The QoL as measured by the RQLQ was also significantly improved, as seen by a decline in RQLQ scores after the end of the treatment ($p<0.0001$).

TSS, NSS, NNSS, and RQLQ score are commonly used endpoints to assess the effectiveness of bilastine and its impact on QoL of patients.[27]

The findings of the current study in Indian patients are consistent with several efficacy and safety studies on bilastine in other populations. A systematic review on efficacy and safety of bilastine administered orally at a dose of 20 mg once daily in adults and adolescents confirmed its efficacy in improving nasal and ocular symptoms in patients with allergic rhinitis.[27] Data from 5 trials involving 3329 patients showed that efficacy of bilastine was equivalent to that of other OAHs with respect to TSS, NSS, NNS, rhinitis discomfort score, and QOL, but that it was more effective than placebo in improving these outcomes.[27]

In the current study, no significant safety concerns were observed, and no AEs or abnormal levels of liver and kidney enzymes were reported. These findings are consistent with a previous study confirming that bilastine was safe and well-tolerated even after 1 year of treatment and was recommended as one of the preferred prescriptions for allergic rhinitis.[24,30] Compared with first-generation OAHs that have been associated with significant adverse effects negatively impacted patients' QoL such as sedation, the use of second-generation antihistamines like bilastine, have facilitated circumvention of first-generation OAHs.[31]

The SSS was used to assess the psychodynamic effects of bilastine 20 mg at 2 hours post-first dose administration.[28] In a meta-analysis by Randhawa et al, efficacy of bilastine was comparable to that of cetirizine, but bilastine was found to be noticeably less somnolescent.[27] In a single-blind, randomized, placebo-controlled, parallel-group trial where bilastine tablets were administered as single doses of 10, 20, and 50 mg (part 1) and as once daily doses of 20 and 50 mg for 14 days (part 2), SSS assessments at pre-dose, 2 and 24 hours after dosing in part 1 and pre-dose, 2 and 24 hours after dosing on Days 1, 8, and 14 in part 2 did not reveal significant differences between bilastine and placebo.[18] Consistent with previous studies, in the current study, most patients continued to have the same SSS score before and after dosing, indicating that bilastine treatment did not cause any further sedation.

The key strength of this study was the real-world assessment of effect of bilastine on comprehensive symptoms of allergic rhinitis and its impact on QoL including sedation in Indian patients, a population for which evidence has been scarce. However, real-world evidence studies comparing its effectiveness, safety, and lack of sedative effect relative to other second-generation OAHs marketed in India may be warranted.

CONCLUSION

In this multicenter, real-world evidence study, once daily dosing bilastine 20 mg for 28 days was found to significantly relieve symptoms of allergic rhinitis as assessed by TSS, NSS, and NNSS, improve QoL scores, and provide good safety profile in Indian patients with allergic rhinitis, further strengthening its acceptability for allergic rhinitis in India.

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REFERENCES

1. Klimek L, Bachert C, Pfaar O, Becker S, Bieber T, Brehler R et al. ARIA guideline 2019: treatment of allergic rhinitis in the German health system. Allergol Select 2019;3:22-50.
2. World Allergy Organization (WAO) white book on allergy, 2011. Available at https://www.worldallergy.org/UserFiles/file/WAO-White-Book-on-Allergy_web.pdf. Accessed on 25 Oct, 2022.
3. Varshney J, Varshney H. Allergic rhinitis: an overview. Ind J Otolaryngol Head Neck Surg. 2015;67:143-9.
4. Singh S, Sharma BB, Salvi S, Chhatwal J, Jain KC, Kumar L. Allergic rhinitis, rhinoconjunctivitis, and eczema: prevalence and associated factors in children. Clin Respir J. 2018;12(2):547-56.
5. Meltzer EO. Quality of life in adults and children with allergic rhinitis. J Allergy Clin Immunol. 2001;108:S45-53.
6. Enna SJ, Bylund DB. XPharm: The Comprehensive Pharmacology Reference. (Enna SJ, Bylund DB, eds.). 1st ed. Amsterdam: Elsevier; 2008.
7. Small P, Frenkiel S, Becker A, Boisvert P, Bouchard J, Carr et al. Rhinitis: A practical and comprehensive approach to assessment and therapy. J Otolaryngol. 2007;36:S5.
8. Kim H, Kaplan A. Treatment and management of allergic rhinitis [feature]. Clin Focus. 2008;1-4.
9. Derendorf H, Meltzer EO. Molecular and clinical pharmacology of intranasal corticosteroids: clinical and therapeutic implications. Allergy. 2008;63:1292-300.
10. Brozek JL, Bousquet J, Baena-Cagnani CE, Bonini S, Canonica GW, Casale TB et al. Allergic rhinitis and its impact on asthma (ARIA) guidelines: 2010 revision. J Allergy Clin Immunol. 2010;126:466-476.
11. Demoly P. Safety of intranasal corticosteroids in acute rhinosinusitis. J Otolaryngology. 2008;29:403-13.

12. Sur DKC, Plesa ML. Treatment of allergic rhinitis. Am Fam Physician. 2015;92:985-92.
13. Seidman MD, Gurgel RK, Lin SY, Schwartz SR, Baroody FM, Bonner JR et al. Clinical practice guideline: allergic rhinitis executive summary. Otolaryngol Head Neck Surg. 2015;152:197-206.
14. Kawauchi H, Yanai K, Wang DY, Itahashi K, Okubo K. Antihistamines for allergic rhinitis treatment from the viewpoint of nonsedative properties. Int J Mol Sci. 2019;20:213.
15. Jauregizar N, de la Fuente L, Lucero ML, Sologuren A, Leal N, Rodríguez M. Pharmacokinetic-pharmacodynamic modelling of the antihistaminic (H1) effect of bilastine. Clin Pharmacokinet. 2009;48:543-54.
16. Church MK. Safety and efficacy of bilastine: a new H(1)-antihistamine for the treatment of allergic rhinoconjunctivitis and urticaria. Expert Opin Drug Saf. 2011;10:779-93.
17. Antonijoan R, Coimbra J, García-Gea C, Puntes M, Gich I, Campo C et al. Comparative efficacy of bilastine, desloratadine and rupatadine in the suppression of wheal and flare response induced by intradermal histamine in healthy volunteers. Curr Med Res Opin. 2016;33:129-36.
18. Togawa M, Yamaya H, Rodríguez M, Nagashima H. Pharmacokinetics, pharmacodynamics and population pharmacokinetic/pharmacodynamic modelling of bilastine, a second-generation antihistamine, in healthy Japanese subjects. Clin Drug Invest. 2016;36:1011-21.
19. Church MK. Comparative inhibition by bilastine and cetirizine of histamine-induced wheal and flare responses in humans. Inflamm Res. 2011;60:1107-12.
20. Horak F, Zieglmayer P, Zieglmayer R, Lemell P. The effects of bilastine compared with cetirizine, fexofenadine, and placebo on allergen-induced nasal and ocular symptoms in patients exposed to aeroallergen in the Vienna Challenge Chamber. Inflamm Res. 2010;59:391-8.
21. Sádaba B, Gómez-Guiu A, Azanza JR, Ortega I, Valiente R. Oral availability of bilastine. Clin Drug Investig. 2013;33:375-81.
22. Bousquet J, Schünemann HJ, Samolinski B, Demoly P, Baena-Cagnani CE, Bachert C et al. Allergic rhinitis and its impact on asthma (ARIA): Achievements in 10 years and future needs. J Allergy Clin Immunol. 2012;130:1049-62.
23. García-Gea C, Martínez J, Ballester MR, Gich I, Valiente R, Antonijoan RM. Psychomotor and subjective effects of bilastine, hydroxyzine, and cetirizine, in combination with alcohol: a randomized, double-blind, crossover, and positive-controlled and placebo-controlled Phase I clinical trials. Hum Psychopharmacol. 2014;29:120-32.
24. Bousquet J, Ansotegui I, Canonica GW, Zuberbier T, Baena-Cagnani CE, Bachert C et al. Establishing the place in therapy of bilastine in the treatment of allergic rhinitis according to ARIA: evidence review. Curr Med Res Opin. 2012;28:131-9.
25. Zuberbier T, Aberer W, Asero R, Bindslev-Jensen C, Brzoza Z, Canonica GW et al. Global Allergy and Asthma European Network; European Dermatology Forum; World Allergy Organization. The EAACI/GA(2) LEN/EDF/WAO Guideline for the definition, classification, diagnosis, and management of urticaria: the 2013 revision and update. Allergy. 2014;69:868-87.
26. Okubo K, Gotoh M, Asako M, Nomura Y, Togawa M, Saito A et al. Efficacy and safety of bilastine in Japanese patients with perennial allergic rhinitis: A multicenter, randomized, double-blind, placebo-controlled, parallel-group phase III study. Allergol Int. 2017;66:97-105.
27. Randhawa AS, Noor NM, Daud MKM, Abdullah B. Efficacy and safety of bilastine in the treatment of allergic rhinitis: A systematic review and meta-analysis. Front Pharmacol. 2022;12:731201.
28. Hoddes E, Dement W, Zarcone V. Abstracts of papers presented to the eleventh annual meeting of the Association for the Psychophysiological Study of Sleep: the development and use of the Stanford sleepiness scale (SSS). Psychophysiology. 1972;9:150.
29. Church MK, Tiongco-Recto M, Ridolo E, Novák Z. Bilastine: A lifetime companion for the treatment of allergies. Curr Med Res Opin. 2019;36:445-54.
30. Sastre J, Mullol J, Valero A, Valiente R. Bilastine Study Group. Efficacy and safety of bilastine 20 mg compared with cetirizine 10 mg and placebo in the treatment of perennial allergic rhinitis. Curr Med Res Opin. 2012;28:121-30.
31. Lynde CW, Sussman G, Dion PL, Guenther L, Hébert J, Rao J et al. Multidisciplinary real-world experience with bilastine, a second-generation antihistamine. J. Drugs Dermatol. 2020;19:145-54.

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