OPEN ACCESS

IJABR

International Journal of Advanced Biotechnology and Research
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-17, Issue2, 2026, pp9-15

Research Article

Allergic Rhinitis' Influence on Quality of Life of Lung and Skin: An Observational Study

Sai Prateek[1], Sindu Mohan[2] and Saai Ram Thejas[1]

Article Info

[1]Department of Otorhinolaryngology, R.V.M. Institute of Medical Sciences, Laxmakkapally Village, Mulugu Mandal, Siddipet District, Telanga, India - 502279.

[2]Department of Otorhinolaryngology, Velammal Medical College and Hospital, Anuppanadi, Madurai, Tamil Nadu, India - 625009.

Corresponding Author:
Dr. Sai Prateek,
Department of Otorhinolaryngology, R.V.M. Institute of Medical Sciences, Laxmakkapally Village, Mulugu Mandal, Siddipet District, Telanga, India - 502279.

Received: 01/05/2026
Accepted: 10/06/2026
Published: 15/06/2026

DOI: 10.5281/zenodo.20696665

Abstract

Background: Allergic Rhinitis (AR) is an IgE-mediated atopic disorder that is increasingly recognized as part of the "atopic march," along with bronchial asthma and atopic dermatitis. Despite this association, many patients with AR remain undiagnosed for coexisting pulmonary and dermatological involvement, leading to unrecognized impairment in quality of life (QoL). The Score for Allergic Rhinitis (SFAR) is a simple diagnostic tool, while the St. George's Respiratory Questionnaire (SGRQ) and Skindex-29 (S29) assess respiratory and dermatological QoL respectively.

Aims and Objectives: To evaluate pulmonary and dermatological QoL in newly diagnosed AR patients and assess the relationship between SFAR to QoL scores and immunological markers.

Methods: A hospital-based observational study was conducted over 6 months in a rural South Indian setting involving 100 patients aged 21–60 years with newly diagnosed AR. Inclusion criteria included elevated IgE (>200 IU/mL) and AEC (>400 cells/µL). Patients completed SFAR, SGRQ, and S29 questionnaires. Data were analyzed using SPSS. The Wilcoxon Signed-Rank Test assessed differences, and Spearman Rank Correlation evaluated associations.

Results: The mean SFAR, SGRQ, and S29 scores were 8.70, 31.60, and 48.40 respectively. Wilcoxon analysis showed significant differences between SFAR and SGRQ, and SFAR and S29 ($p < 0.001$). However, correlations were weak and not statistically significant for SFAR with SGRQ ($r_s = 0.135$, $p = 0.182$) and S29 ($r_s = 0.061$, $p = 0.544$). SFAR demonstrated a weak but significant correlation with IgE ($r_s = 0.248$, $p = 0.013$). ROC analysis showed modest predictive ability of SFAR for impaired QoL, with improved performance at lower thresholds.

Conclusion: AR patients exhibit impaired respiratory and dermatological QoL despite lack of prior diagnosis of asthma or dermatitis. SFAR, though not strongly correlated with QoL scores, may serve as a useful screening tool to identify patients requiring further multidisciplinary evaluation.

Keywords: Allergic Rhinitis, St. George's Respiratory Questionnaire, Skindex-29, Score for Allergic Rhinitis, Quality of Life.

Introduction

Allergic Rhinitis (AR) is an Immunoglobulin E (IgE) mediated atopic disease. The immune response here is against inhaled antigens in the immediate phase, with a subsequent leukotriene-mediated late phase. It is characterized by symptoms of nasal congestion/block, clear rhinorrhoea, sneezing, postnasal drip and excessive nasal pruritis. It is broadly divided into seasonal and perennial for better understanding of the symptoms [1]. Until the development of the unified airway theory in 2016, AR was thought to be a disease of the nose alone. It has been proved now that it is a part of a systemic allergic response also involving Atopic Dermatitis (AD) and Bronchial Asthma (BA) [2].

Approximately 22% of adolescents currently suffer from AR in India but this can be skewed because of the lack of literature from studies in rural setups. Risk factors include mainly environmental exposures or genetic factors but behavioural risk factors such as the presence of dumpsters near residences, movement of vehicles near homes can be seen in Urban societies [3]. Bronchial Asthma is a chronic inflammatory respiratory condition characterized by intermitted episdoes of breathlessness, cough and wheeze. There is usually a genetic tendency to produce specific IgE antibodies in response to common environmental allergens in most affected individuals. Due to the nonspecific nature of the symptoms, distinguishing BA from other respiratory illnesses can be challenging to a clinician [4]. Atopic Dermatitis (a specific form of eczema), is the most common chronic inflammatory skin disease. It presents with dry skin, eczematous lesions and lichenification because of abnormalities of the epidermis. It is typically a clinical diagnosis because of classical patterns of the lesions [5]. The Score for Allergic Rhinitis (SFAR) is a simple tool developed in 2002 for an objective assessment of AR. It compasses 8 features of AR and is easy to use. The score ranges from 0 to 16 (Image 1). It helps understand the symptomatology and also history of the patient [6]. Risk factors for developing AR include a family history of atopy, male sex, a presence of allergen-specific IgE, a serum IgE greater than 100 IU/mL before age 6, and higher socioeconomic status [7]. On a detailed clinical examination, frequent nasal sniffing, on and off cough/breathlessness, transverse supra-tip nasal crease and allergic shiners might be seen. Thus, a detailed history of other forms of the "atopic march" i.e. BA and AD with AR must be taken [8]. The St George's Respiratory Questionnaire (SGRQ), developed in 1991 (Image 3), is a standardized self-completed questionnaire for measuring impaired health and perceived well-being in diseases of the airway [9]. Skindex-29 (S29), developed in 1996 (Image 2), is a survey based questionnaire which measures the effects of skin disease on patients' quality of life [10]. Both the scales evaluate a burden based on symptoms and day-to-day functioning which helps assess both patient and clinical related evidences. The aim of this study is to quantify the Pulmonary and Dermatological Quality of Life (QoL) in newly diagnosed Allergic Rhinitis patients who have otherwise not been diagnosed with or had consultations for BA and AD.

Materials and Methods

Study Setting: At a rural Hospital in South India. Study has been approved by Institutional Ethics committee of College.

Study Duration: 6 months between the months of October 2025 to March 2026.

Sample Size: Continuous 100 patients who provided informed consent.

Type of study: Observational Study.

Inclusion Criteria:

1. Newly diagnosed case of Allergic Rhinitis clinically.
2. An IgE level of greater than 200 IU/mL.
3. An Absolute Eosinophil Count (AEC) of greater than 400 cells/uL.
4. Age group of 21-60.

Exclusion Criteria:

1. Associated space occupying lesions in the nose and nasopharynx.

2. Any previous diagnosis or treatment related to Bronchial Asthma or Atopic Dermatitis.
3. History of intake of medicines which could have interfered with the levels of IgE or Eosinophils.

Study Protocol: All patients diagnosed with AR clinically were asked to fill the SFAR to quantify the problem. Along with it, all patients also filled in the QoL S29 and SGRQ questionnaires. The input was taken by the primary investigator to prevent bias and in cases of need the questions were loosely translated into the local language for better understanding.

Statistical Analysis: All the data was entered in Microsoft Excel. Data was computed using SPSS Software (v25, IMB Corp., NY., USA). Since the data was not linear, Wilcoxon signed-rank test was used to assess variance. A 95% confidence interval was used and a p-value of <0.05 was considered significant. Spearman rank was used to identify correlations.

Observations and Results

In the study group, 58 were male and 42 were female. The most common age group was 31-40 years and the least common was 51-60 years.

Test	Parameter	Value	p-value
Wilcoxon signed-rank test	Test Statistic (Z)	0.000	< 0.001
Spearman rank correlation	Correlation (r s)	0.135	0.182

Table 1 - Correlations between SFAR and SGRQ

As seen in Table 1, Wilcoxon signed-rank test showed a statistically significant difference between SFAR and SGRQ scores ($p < 0.001$). However, Spearman correlation demonstrated a weak positive correlation ($r_s = 0.135$) that was not statistically significant ($p = 0.182$).

Test	Parameter	Value	p-value
Wilcoxon signed-rank test	Test Statistic (Z)	0.000	<0.001
Spearman rank correlation	Correlation (r s)	0.061	0.544

Table 2 - Correlations between SFAR and S29

As seen in Table 2, Wilcoxon signed-rank test showed a highly significant difference between SFAR and S29 scores ($p < 0.001$). However, Spearman correlation revealed a very weak positive correlation ($r_s = 0.061$) which was not statistically significant ($p = 0.544$).

Test	Parameter	Value	p-value
Wilcoxon signed-rank test	Test Statistic (Z)	-8.65	< 0.001
Spearman rank correlation	Correlation (r s)	0.248	0.013

Table 3 - Paired Sample Correlations between SFAR and IgE

As seen in Table 3, Wilcoxon signed-rank test revealed a highly significant difference between SFAR and IgE levels ($p < 0.001$). Spearman correlation demonstrated a weak positive correlation ($r_s = 0.248$), which was statistically significant ($p = 0.013$).

Test	Parameter	Value	p-value
Wilcoxon signed-rank test	Test Statistic (Z)	-8.72	< 0.001
Spearman rank correlation	Correlation (rs)	0.182	0.069

Table 4 - Correlations between SFAR and AEC

As seen in Table 4, Wilcoxon signed-rank test demonstrated a highly significant difference between SFAR and AEC values ($p < 0.001$). Spearman correlation showed a weak positive correlation ($r_s = 0.182$), which was not statistically significant ($p = 0.069$).

	Mean	N	Standard Deviation	Standard Error of Mean
SFAR	8.70	100	3.92	0.39
SGRQ	31.60	100	13.53	1.36
S29	48.40	100	12.12	1.21
IgE	448.20	100	196.77	19.68
AEC	616.30	100	156.70	15.67

Table 5 - Descriptive Statistics of all parameters

Table 5 shows the descriptive statistical distribution of all parameters. As seen in Tables 1 to 4, the p-value was significant in the Wilcoxon Signed-Rank Test. Even though significance was achieved, the Spearman Correlation was close to 0 indication no meaningful positive or negative relationship between SFAR & SGRQ, SFAR & S29 and SFAR & SFAR & IgE. The test showed a mild but meaningful association between SFAR and Serum IgE levels.

The most common complaints in the SGRQ (Image 3) were "cough or breathing embarrasses me in public", "I cough frequently" and "playing sports or heavy exercise causes breathlessness".

The most common complaints in the S29 (Image 2) were "my skin itches", "my skin condition makes me feel unattractive" and "my skin interferes with my hobbies".

Table 5 also recognizes that the average S29 is 48.4 out of a maximum of 100. This is particularly high for someone who has not been diagnosed before with Atopic Dermatitis. The average SGRQ is 31.6 out of a maximum of 96. This, although not very high, is still not ideal for someone who has not been diagnosed before with Bronchial Asthma.

Image 1 - The Score for Allergic Rhinitis

Scoring criterion	Score	Cumulative score
Nasal blocks	1	
Running nose	1	2
Sneezing	1	3
Perennial Cough	1	4
Seasonal/Perennial	1	5
Nasal symptoms with itchy-watery eyes	2	7
House Dust trigger nasal symptoms	1	8
Pollen trigger nasal symptoms	1	9
Perceived allergic status	2	11
Previous medical diagnosis of allergy	2	13
Previous positive tests of allergy	1	14
Family history of allergy	2	16
Total score		**16**

No.	Question	Score (0/25/50/75/100)
	Symptoms	
1	My skin hurts	
2	My skin burns or stings	
3	My skin itches	
4	My skin is irritated	
5	My skin is sensitive	
6	My skin condition bleeds	
7	My skin condition bothers me physically	
	Emotions	
8	I worry that my skin condition may get worse	
9	I feel embarrassed about my skin condition	
10	I feel frustrated about my skin condition	
11	I feel depressed because of my skin condition	
12	I feel ashamed of my skin condition	
13	I feel angry about my skin condition	
14	I worry that my skin condition will leave scars	
15	My skin condition makes me feel unattractive – skin	
16	I am bothered by other people's reactions to my skin	
17	I feel self-conscious about my skin	
	Functioning	
18	My skin condition affects my daily activities	
19	My skin interferes with my work or school	
20	My skin affects my interactions with others	
21	I avoid social situations because of my skin	
22	My skin condition affects my sleep	
23	My skin affects my relationships	
24	My skin interferes with my hobbies	
25	I avoid physical contact because of my 'skin	
26	My skin affects my sexual life	
27	My skin condition makes me stay at home more	
28	My skin interferes with my ability to relax	
29	My skin condition affects my overall quality of life	
TOTAL (Sum of all scores)		
FINAL SCORE (sum/29)		0-100

Image 2 - The SKINDEX29 Questionnaire

No.	Question	Score (0/1/2/3/4)
	Symptoms	
1	I cough frequently	
2	I bring up sputum (phlegm)	
3	I have wheezing in my chest	
4	I get attacks of shortness of breath	
5	I have severe chest attacks	
6	My breathing worsens during infections	
	Activity	
7	Sitting or lying still causes breathlessness	
8	Washing or dressing causes breathlessness	
9	Walking around the house causes breathlessness	
10	Walking outside on level ground causes breathlessness	
11	Walking up stairs causes breathlessness	
12	Walking up hills causes breathlessness	
13	Carrying heavy loads causes breathlessness	
14	Playing sports or heavy exercise causes breathlessnes	
	Impact	
15	My cough or breathing embarrasses me in public	
16	My breathing interferes with my work	
17	I avoid social activities because of breathing problems	
18	My breathing disturbs my sleep	
19	My breathing makes me feel tired	
20	I worry that my breathing will get worse	
21	My breathing affects my family life	
22	I feel frustrated because of breathing problems	
23	My breathing limits my ability to travel	
	TOTAL SCORE (sum of all scores)	0-96

Image 3 - The St. George's Respiratory Questionnaire

A Receiver Characteristic Operating Curve (ROC) showed that SFAR demonstrated little utility in identifying patients with significant respiratory impairments (SGRQ ≥ 30) with the area under the curve (AUC) being 0.578. It also showed that SFAR showed a decent performance in detecting skin impairments (S29 ≥ 33) with the AUC being 0.624. When the threshold of assessing poor QoL for both the SGRQ and S29 was lowered to 20, the AUC was 0.694 in the former and 0.727 in the latter.

Discussion

As seen in the study, it was seen that the SFAR has a mild relationship in predicting the dermatological and pulmonological quality of life. Although a mildly poor Quality of Life is seen via both the S29 (average of 48 out of a maximum of 100) and SGRQ (average of 32 out of a maximum of 96), the Spearman correlation was not significant. It must be understood here that the SFAR is not a tool for either of Bronchial Asthma or Atopic Dermatitis but still helps in identifying symptoms which were previously not accounted for. That said, the ROC showed that a higher SFAR accurately predicts score of greater than 20 of both S29 and SGRQ.

A study by Prado et al in 2022 [11] stated that the association between rhinitis and asthma may be due to several factors. On the one hand, the rhinitis, by itself, may aggravate the asthma since the asthmatics with rhinitis have a lower FEV1 and greater bronchial hyper-reactivity. Also, there could be factors (genetic and environmental) that may contribute to aggravating both the asthma and the allergic rhinitis. It is known that allergic sensitisation in at the cellular level which has a strong genetic and environmental cause. In 2019, Vikram and colleagues found that out of 1161 patients of BA, prevalence of coexisting AR was found to be 65.24%, with the highest prevalence (80%) in the southern regions of India [12].

A study by Knudgaard et al in 2021 stated that the pooled prevalence of allergic rhinitis was

40.5% in patients with AD in their study sample of 643 articles [13]. Weller and colleagues, in 2012, stated that beyond the barrier disturbance genetic polymorphisms also appear to be responsible for alterations of the acquired immune system including increased IgE production and the priming of T cells in the direction of Th2 typical for atopy [14].

Although a clear linear relationship has been established between AR and BA/AD, there is no clear common QoL questionnaire which can be used for all entities put-together. Thus, SFAR is being used here to identify if it can be a screening tool for the other systems as well along with the nasal system.

A study by Pinart et al in 2014 [15] found that coexistence of eczema, rhinitis, and asthma in the same child was more common than expected by chance alone-both in the presence and absence of IgE sensitisation-suggesting that these diseases share causal mechanisms. They assessed children from 12 European birth cohort studies participating in MeDALL (Mechanisms of the Development of ALLergy) using different questionnaires for all 3 entities. This aligns with the present study wherein diagnosed cased of AR with no previous history of AD or BA had isolated symptoms with regard to both lung and skin.

The Wilcoxon Signed-Rank Test and the Spearman correlation were both significant between SFAR and Serum IgE indicating that a higher SFAR has a positive correlation to a higher IgE. This correlated well to a study done by Tegnoor et al in 2017 [16] wherein it was stated that Serum IgE levels were elevated in more than 90% of patients with sneezing as the predominant symptom .The IgE values were higher in patients with symptoms of sneeze plus wheeze as compared to those with sneeze alone. Eosinophil counts were consistently higher in the allergic population and they are not influenced by gender, the presence of asthma, or of smoking IgE levels greater than 140 IU/ml and eosinophil counts greater than 80 cells/ml are suggestive of an atopic aetiology for patients with signs and symptoms of rhinitis. Although only elevated AEC was taken in this present study, it was clearly noted that there was a positive correlation between SFAR and AEC which is consistent with the findings of Tegnoor et al's study.

An expert consensus in 2025 by Mohan Kameshwaran et al [17] recommended that individuals with AR be evaluated for the presence of associated conditions such as bronchial asthma, atopic dermatitis, sleep-disordered breathing, conjunctivitis, rhinosinusitis, and otitis media. This is a vital point since the co-existing conditions can cause poor QoL and often go unnoticed. This is precisely what was formulated in the present study.

Conclusion

It is a known fact that Allergic Rhinitis, Bronchial Asthma and Atopic Dermatitis co-exist because of the same pathogenesis. As a Rhinologist, all cases of AR can be screened with the basic St George's Respiratory Questionnaire and the Skindex 29 to identify red flags of unnoticed symptoms. As evidenced by the study, SFAR is an easy tool for diagnosis of AR and it has been proven to be sensitive in catching SGRQ and S29 scores of >=20 in patients who otherwise do not have any history of BA and AD. An awareness can be created in all Rhinologists to look for something that even the patinet might not have thought of by a simple evaluation. The patient can then have Dermatology and Pulmonology consultations for further management.

Declaration: The study was performed after obtaining informed consent and in accordance with the Declaration of Helsinki.

Acknowledgement: None stated.

Conflict of Interest: The authors declare that there are no conflicts of interest

Funding: This work received no specific grant from any funding agency

Declaration of Non-Use of AI: AI-assisted tools were used only for language refinement, formatting, and manuscript organization. No AI tools were used for data generation, analysis, interpretation, or scientific decision-making.

References

1. Akhouri S, House SA. Allergic Rhinitis. [Updated 2023 Jul 16]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK538186.
2. Kakli HA, Riley TD. Allergic Rhinitis. Prim Care. 2016;43(3):465-475.
3. Moitra S, Mahesh PA, Moitra S. Allergic rhinitis in India. Clin Exp Allergy. 2023;53(7):765-776.
4. Goldin J, Cataletto ME. Asthma. [Updated 2024 May 3]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430901.
5. Kolb L, Ferrer-Bruker SJ. Atopic Dermatitis. [Updated 2023 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK448071/
6. Annesi-Maesano I, Didier A, Klossek M, Chanal I, Moreau D, Bousquet J. The score for allergic rhinitis (SFAR): a simple and valid assessment method in population studies. Allergy. 2002;57(2):107-114.
7. Tran NP, Vickery J, Blaiss MS. Management of rhinitis: allergic and non-allergic. Allergy Asthma Immunol Res. 2011;3(3):148-156.
8. Small P, Kim H. Allergic rhinitis. Allergy Asthma Clin Immunol. 2011;7 Suppl 1(Suppl 1):S3.
9. Jones PW, Quirk FH, Baveystock CM. The St George's Respiratory Questionnaire. Respir Med. 1991; 85 Suppl B:25-37.
10. Chren MM, Lasek RJ, Quinn LM, Mostow EN, Zyzanski SJ. Skindex, a quality-of-life measure for patients with skin disease: reliability, validity, and responsiveness. J Invest Dermatol. 1996; 107(5):707-713.
11. Acevedo-Prado A, Seoane-Pillado T, López-Silvarrey-Varela A. et al. Association of rhinitis with asthma prevalence and severity. Sci Rep 12, 6389 (2022).
12. Vikram J, Alpa D, Ramesh BR, Sharad T, Anil C, Nisha K et al. Coexistence of allergic rhinitis and asthma in Indian patients The CARAS survey. Lung India 2019; 36(5):411-416.
13. Knudgaard MH, Andreasen TH, Ravnborg N, Bieber T, Silverberg JI, Egeberg A et al. Rhinitis prevalence and association with atopic dermatitis: A systematic review and meta-analysis. Annals of Allergy, Asthma & Immunology 2021; 127(1):49-56.
14. Weller K, Soost S, Worm M, Maurer M, Zuberbier T. Atopic dermatitis and allergic rhinitis – do co-effects in therapy exist?. JDDG: Journal der Deutschen Dermatologischen Gesellschaft 2012, 10: 221-239.
15. Pinart M, Benet M, Annesi-Maesano I, et al. Comorbidity of eczema, rhinitis, and asthma in IgE-sensitised and non-IgE-sensitised children in MeDALL: a population-based cohort study. Lancet Respir Med. 2014;2(2):131-140.
16. Tegnoor MS, Jabri OBA, Kumar MV, Kurle V. Assessment of serum IgE levels in patients of allergic rhinitis. Al Am een J Med Sci 2017; 10(2): 136-140.
17. Mohan K, Juvekar M, Haldipur D, Nath B, Rao AVR, Shetty A. Diagnosis and management of allergic rhinitis: An Indian expert consensus by otorhinolaryngologists. Asia Pacific Allergy 15(4):319-328.