

## Original Research Article

# A cross sectional observational study of severity of allergic rhinitis and its impact on asthma

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**Received:** 08 December 2019

**Revised:** 02 February 2020

**Accepted:** 04 February 2020

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### ABSTRACT

**Background:** Allergic rhinitis (AR) and asthma are chronic diseases that often coexist and whose prevalence is increasing day by day. Uncontrolled allergic rhinitis may be associated with worsening of asthma and hence optimal treatment of AR may improve the coexisting asthma. The objective of the study was to study the severity of allergic rhinitis and its impact on asthma.

**Methods:** A cross sectional study was conducted on 60 patients, at our Institute from November 2017 to June 2019 who were clinically diagnosed to have AR and asthma. Patients were evaluated by proper history taking, in detailed clinical examination and diagnostic nasal endoscopy and spirometry.

**Results:** In our study out of 60 patients, majority fell in 20 to 40 age group. According to allergic rhinitis and its impact on asthma (ARIA) classification 10 (17%) had mild intermittent AR, 12 (20%) had mild persistent AR, 5 (8%) had moderate/severe intermittent AR and 33 (55%) had moderate or severe persistent AR. In case of moderate/severe persistent AR: 4 had intermittent, 9 had mild persistent, 10 had moderate persistent and 10 severe persistent asthma. Spearman's rank correlation was done between severity of AR and severity of asthma, spearman's rho: 0.365,  $p < 0.004$  was significant.

**Conclusions:** We noted that as the severity of allergic rhinitis increased, severity of asthma also increased, which was a linear correlation.

**Keywords:** Allergic rhinitis, ARIA, Asthma, United airway disease

### INTRODUCTION

Allergic rhinitis (AR) and asthma are chronic inflammatory disorders causing major illness and disability worldwide. The prevalence of AR has been increasing worldwide affecting over 500 million, it affects around 10% to 30% of adults and 40% of children.<sup>1,2</sup> The link between AR and asthma has been studied in many epidemiological studies, 10% to 40% of patients with AR are associated with asthma and over 80% patients with asthma have AR.<sup>2</sup>

The link existing between the upper and lower airways has been observed repeatedly in the past, but the concept of united airways disease (UAD) is a matter of recent years.<sup>3</sup> Most of the times AR and asthma coexist and AR is an independent risk factor for asthma. So, diagnosis and management of AR has a profound impact on asthma occurrence and trigger.

There have been few studies in literature evaluating the impact of AR severity on asthma, and hence this study has been undertaken to study the severity of AR and its impact on severity of asthma.

**METHODS**

This was a cross-sectional observational study conducted at S.S. Institute of Medical sciences and Research centre, Davangere for a period of 2 years from November 2017 to June 2019. The study protocol was approved by the Institutional Ethics Committee. Totally, 60 patients clinically diagnosed to have both AR and asthma who were aged above 6 years formed the study group. Patients with nasal polyposis and chest diseases other than Asthma were excluded from the study. AR was diagnosed if symptoms of anterior or posterior rhinorrhea, sneezing, nasal blockage and/or itching of the nose occurred for two or more consecutive days for more than one hour on most days. The severity of AR was assessed using allergic rhinitis and its impact on asthma (ARIA) guidelines.<sup>2</sup> Asthma was diagnosed if symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation were present. Severity of asthma was assessed according to global initiative for asthma (GINA) and national asthma education and prevention program (NAEPP) guidelines.<sup>4,5</sup> Patients were subjected for investigations, including anterior rhinoscopy, diagnostic nasal endoscopy and spirometry. Skin prick test and serum specific immunoglobulin E (IgE) were not performed due to logistic reasons and financial constraints.

**Statistical analysis**

The data collected was entered in Microsoft excel and analyzed using IBM SPSS version 16 software. Categorical data was represented in the form of frequency and percentage. Chi Square test was applied to know the association between variables. Spearman's Rho correlation test was used to determine the relationship between the two variables. A p value of <0.05 was considered statistically significant.

**RESULTS**

In our study out of 60 patients, majority fell in 20 to 40 age group (Table 1). Out of them 29 (48.3%) were male and 31 (51.7%) were female (Table 2). Positive family history of allergy was noted in 31.7% of cases. According to ARIA classification, based on duration of AR- 75% had persistent AR and 25% had intermittent AR and

based on severity of symptoms- 63.3% had moderate or severe AR and 36.7% had mild AR, in general 10 (17%) had mild intermittent AR, 12(20%) had mild persistent AR, 5(8%) had moderate/severe intermittent AR and 33(55%) had moderate or severe persistent AR (Figure 1).

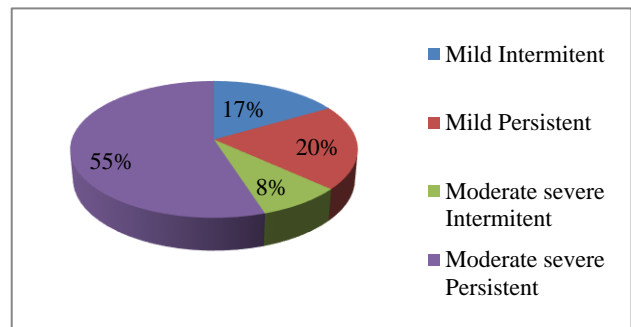
Out of 22 cases of mild AR-7 had intermittent, 7 had mild persistent and 8 had moderate persistent Asthma. Out of 38 cases of moderate/severe AR-5 had intermittent, 10 had mild persistent, 13 had moderate persistent asthma and 10 had severe persistent asthma. Chi Square test was applied p value <0.03, was significant. Duration of AR was correlated with asthma severity. Chi square test was applied p value <0.478 was not significant.

**Table 1: Age distribution.**

Age (in years)	Frequency	Percentage (%)
<20	9	15.0
20-29	18	30.0
30-39	18	30.0
40-49	5	8.3
≥50	10	16.7
<b>Total</b>	<b>60</b>	<b>100.0</b>

**Table 2: Gender distribution.**

Gender	Frequency	Percentage (%)
<b>Male</b>	29	48.3
<b>Female</b>	31	51.7
<b>Total</b>	<b>60</b>	<b>100.0</b>



**Figure 1: Severity of allergic rhinitis as classified by ARIA guidelines.**

**Table 3: Correlation between severity of allergic rhinitis and severity of asthma.**

Severity of AR	Severity of asthma				Total
	Intermittent	Mild persistent	Moderate persistent	Severe persistent	
<b>Mild intermittent</b>	4	4	2	0	10
<b>Mild persistent</b>	3	3	6	0	12
<b>Moderate severe intermittent</b>	1	1	3	0	5
<b>Moderate severe persistent</b>	4	9	10	10	33
<b>Total</b>	<b>12</b>	<b>17</b>	<b>21</b>	<b>10</b>	<b>60</b>

Spearman's rho r=0.365, p<0.004, highly significant.

In case of moderate or severe persistent AR, 4 had intermittent, 9 had mild persistent, 10 had moderate persistent and 10 severe persistent asthma. Spearman's rank correlation was done between severity of AR and severity of asthma, spearman's rho: 0.365, p value <0.004 was significant (Table 3).

## DISCUSSION

We did a cross sectional observational study to study the impact of severity of AR on asthma. The study population included 60 patients who satisfied inclusion criteria. All patients were evaluated by thorough clinical examination, diagnostic nasal endoscopy and spirometry with reversibility.

In our study, majority of patients were in the age group of 20 to 40 yrs. The male to female ratio was almost similar-1:1.06.

In our study, 17% had mild intermittent AR, 20% had mild persistent AR, 8% had moderate/severe intermittent and 55% of them had moderate or severe persistent AR.

Bousquet al studied a total of 3052 patients with AR and classified them according to severity and duration and noted that 11% had mild intermittent AR, 8% had mild persistent AR, 35% had moderate/severe intermittent and 45% of them had moderate or severe persistent AR.<sup>6</sup>

The distribution of the severity of AR was mild intermittent (25.7%), moderate or severe intermittent (16.4%), mild persistent (16.4%), and moderate /severe persistent (41.2%) as stated in allergic rhinitis and its impact on asthma in Asia Pacific and the ARIA update 2008.<sup>2</sup>

When compared to above studies, we noted majority fell in moderate/severe persistent AR group.

AR and asthma have high correlation.<sup>7</sup> Over 80% of asthmatics have AR while 10-40% of individuals with AR have asthma.<sup>2</sup> AR is a risk factor for asthma, and the diagnosis of AR can precede asthma.<sup>7,8</sup> Studies of both adult and paediatric populations provide evidence for increased risk of asthma development in individuals with AR.

Burgess et al found that childhood AR was associated with a 7-fold increased risk of asthma in preadolescence, a 4-fold increased risk of asthma in adolescence and a 2-fold increased risk in adult life. Furthermore, childhood AR increased the likelihood of having asthma that persisted into middle age by 3-fold.<sup>9</sup>

Similarly, a prospective 8-year study of children with a history of recurrent wheezing demonstrated that a history of AR was associated with significantly increased odds of persistent asthma symptoms.<sup>10</sup>

Bousquet et al noted that among subjects with AR, subjects with more severe AR symptoms are more likely to suffer from asthma, and potentially more severe asthma, than subjects without AR or those with milder AR.<sup>11</sup>

For example, the DREAMS study group found that 33% of subjects with moderate severe persistent rhinitis had asthma compared to 2% of the control population.<sup>12</sup>

Similarly, Ponte et al demonstrated that the severity of AR was positively correlated with asthma severity, as evidenced by a 3.8-fold increase in the odds of emergency room visits in patients with moderate to severe rhinitis as compared to patients without rhinitis. Additionally, patients with moderate to severe rhinitis had a 12.7-fold increase in the odds of having uncontrolled asthma compared to those without rhinitis.<sup>13</sup>

Sasaki et al noted that among paediatric patients with asthma, uncontrolled asthma was present in 9.2% of those without rhinitis, 15.3% of those with mild-moderate rhinitis, and 29.2% of those with severe rhinitis.<sup>14</sup>

Kumar et al conducted a prospective cohort study on 130 children between the age group of 5 and 15 years, and noted that the prevalence of AR in children with asthma was 58%, of which 56% had intermittent and 44% had persistent AR and he also concluded that the presence of AR in children with asthma is associated with poor asthma control.<sup>15</sup>

Chinnakannan et al in his study noted that the point prevalence of AR was 13.6%, and of sinusitis was 2% in childhood asthma. On multivariate analysis, AR, sinusitis, and family history were significantly associated with asthma severity.<sup>16</sup>

Jaggi et al conducted a survey on coexistence of AR and asthma (CARAS) in ten cities across India, and noted that AR and asthma was significantly associated with the presence of personal and family history of atopy. Passive smoking, exposure to biomass fuel, and the presence of pets at home were also significantly associated with AR-asthma coexistence. Prevalence of AR was found to increase with increasing asthma severity.<sup>17</sup>

The ARIA working group has proposed that AR and asthma may be manifestations of one syndrome in two parts of the respiratory tract, with more severe AR corresponding directly with more severe asthma.<sup>2</sup>

So, most of the above studies conclude that severe the AR, more severe the asthma and reinforces the need for early diagnosis and guideline-based management of coexistent AR and asthma.

### Limitations of our study

As this was a cross sectional study periodic assessment could not be done, that would have revealed more clues

about disease behaviour. We have not taken into consideration the effects of medications that might have affected the clinical findings. Smaller sample size of study.

## CONCLUSION

Majority in our study had moderate or severe persistent AR. There was a linear correlation between severity of Allergic rhinitis and severity of asthma. Co-occurrence of the symptoms of the two diseases suggests that AR and bronchial asthma share a common pathogenesis and should be treated as a single airway disease. Treating AR might have significant impact on asthma co-occurrence and morbidity.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Shekharappa MK, Urs RD. A cross sectional observational study of severity of allergic rhinitis and its impact on asthma. *Int J Otorhinolaryngol Head Neck Surg* 2020;6:547-50.