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Epidemiological prospective study on estimating the coexistence of allergic rhinitis and asthma in adult patients

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Abstract

Background: Both allergic rhinitis and asthma are immunoglobulin E-mediated allergies, triggered by similar allergens and have inter-related inflammatory and pathophysiological mechanisms.

Objective: To evaluate the prevalence coexistence of allergic rhinitis and asthma who are attending allergy outpatient clinics.

Methods: This epidemiological prospective study was carried out during the period January 2019 to March 2020. With the help of questionnaire demographic data and baseline clinical features along with a personal and family history of allergic were noted. According to the Allergic Rhinitis and its Impact on Asthma guidelines and Global Initiative for Asthma both allergic rhinitis and asthma were classified. Prevalence of coexist were estimated from the detailed statistical analysis.

Results: Data were obtained from 650 asthma patients with mean age of 41.5 years. Among 650 patients, asthma was major complaint of 340 and 310 patients visited for allergic rhinitis. Concomitant allergic rhinitis affected 85% of patients with asthma. The high prevalence of the co-existence of rhinitis was found in patients with intermittent asthma (88%) and low rate was found with severe persistent asthma (34%). The prevalence of the comorbidity of asthma and rhinitis decreased as age of patents increased. Family histories, smoking habits, association with pets or animals have significant impact on the coexistence.

Conclusion: This study indicated that the allergic rhinitis is coexist with asthma and at higher rate in the older patients with severe the asthma. This study reinforces the need for early diagnosis and guideline-based management of allergic rhinitis in patients with asthma.

Keywords: Epidemiological prospective, Estimating, Coexistence, Allergic, Asthma, adult patients

Introduction

Allergic rhinitis is a most common disease falling under the category of atopic disorders. Allergic rhinitis patients often sustain loss of productivity and significant morbidity ^[1]. Its principal symptoms include nasal congestion, rhinorrhea, sneezing, and nasal itching. Different kind of allergens such as airborne pollens, molds, dust mites, and animals may induce allergic rhinitis or triggers symptoms ^[2]. Skin testing or serum sampling helps to confirm diagnosis and also guide treatments. Although allergic rhinitis is not a serious illness, it is clinically relevant because it underlies many complications, is a major risk factor for poor asthma control ^[3].

Asthma is a heterogenic condition due to chronic inflammation of the lower respiratory tract. Characteristic features of asthma are variable airway obstruction and bronchial hyperresponsiveness. Clinically symptoms are cough, recurrent episodes of wheeze, chest tightness, and shortness of breath ^[4]. Asthma is often associated with various comorbidities such as gastroesophageal reflux disease, obstructive sleep apnea, hormonal disorders, sinusitis and rhinitis ^[5].

Various studies on pathophysiological and clinical parameters since last 50 years suggested that allergic rhinitis and allergic asthma frequently co-exist ^[6-8]. These apparently separate disorders are manifestations of the same disease expressed to a greater or lesser extent in either the upper or the lower airways. While allergic rhinitis is the atopic diseases of the nose, asthma is that of the lungs and both are related to each other, and coexist in many patients. The presence of allergic rhinitis allergic rhinitis is considered as a etiological risk factor for, both the incidence as well as the severity of, asthma ^[9].

The coexistence of AR and asthma can lead to delay in the right treatment, as these patients often undergo rounds of consultations with chest physicians, allergy experts, otolaryngologists, general physicians, and pediatricians. Moreover, treatment focus is mainly on asthma with less attention given to the associated rhinitis, which often goes unrecognized. This emerging concept has important implications for both the diagnosis and the management of these extremely common and potentially disabling illnesses. About 4% to 11% of the general population has asthma, whereas the prevalence of allergic rhinitis is around 10% to 30% [10]. Between 20% and 50% of patients with allergic rhinitis have asthma, and 30% to 90% of patients with asthma have concomitant rhinitis [11, 12]. In India, the burden of allergic diseases has been on a rising trend in terms of prevalence as well as severity. The simultaneous presentation of rhinitis and asthma is independent of the etiology of the disorder. Moreover, allergic rhinitis may be a predisposing risk factor for the development of asthma [13, 14]. The frequent coexistence of asthma and rhinitis suggest that the presence and severity of allergic rhinitis should be assessed in every patient with asthma for adequate management of both diseases. There are limited studies on simultaneous presentation of allergic rhinitis and asthma [15, 16]. This study is aimed to assess the co-existence of allergic rhinitis in patients with asthma attending allergy outpatient clinics and examine the inter-relationship between the two disease conditions.

Materials and Methods

Study type

This is a prospective epidemiological study carried out during January 2019 to March 2020 with approval of ethics committee.

Subjects and demography

Total 650 patients with complaint of either allergic rhinitis or asthma are selected in this study. These patients were visiting our out patients department. After obtaining written informed consent from participating patients we have provided them a structured questionnaire. This requested demographic data (age, gender, residence), data on exposure to pets or other animals, smoking, personal and family history of atopy, clinical features of asthma and rhinitis (frequency and severity of the symptoms, exacerbations, duration of the disease).

Clinical evaluation

The severity of allergic rhinitis was classified according to the ARIA [17] and that of asthma by Global Initiative for Asthma (GINA) report [18]. Skin prick testing was performed in all patients with a panel of the most relevant aeroallergens in each geographical area. Spirometry was carried out according to guidelines of European Respiratory Society for adult patients [19].

Statistical analysis

We used Graph-Pad Prism software for various statistical test performed to evaluate the results. We used Analysis of variance to compare quantitative variables between 2 or more factors and post-hoc test to compare several factors together.

Results

Clinical and demographic data of 650 patients who participated in the study are shown in Table 1.

Table 1: Demographic and Clinical Characteristics of the Study Population

Parameters (N = 650)	n (%)
Age (Yrs)	41.5
Gender	
Male	443 (68.15)
Female	207 (31.85)
Non-Smokers	421 (64.76)
Residence	
Urban	390 (60)
Rural	260 (40)
Exposure to pets	280 (43.07)
Family history of atopy	
Rhinitis	267 (41.07)
Asthma	270 (41.53)
Personal history of atopy	
Food allergy	110 (16.92)
Urticaria	84 (12.92)
Atopic dermatitis	53 (8.15)

Among 650 patients, asthma was major complaint of 340 and 310 patients visited for allergic rhinitis. Concomitant allergic rhinitis affected 85% (289 of 340) of patients with asthma. On the other hand, asthma was found in 75% of the patient with allergic rhinitis (232 of 310 subjects).

Classification of asthma severity in these patients according to GINA and allergic rhinitis as per ARIA is shown in Table 2. According to the frequency of symptoms, allergic rhinitis was classified as intermittent in 55% and persistent in 45% of patients. Severity was stratified as mild in 49% and moderate-persistent in 51% (Table 2).

Table 2: Classification of Rhinitis (ARIA) and Asthma (GINA)

Allergic rhinitis		Asthma	
Stage	n (%)	Stage	n (%)
Intermittent	256 (39.38)	Mild intermittent	189 (29.07)
Mild persistent	212 (32.61)	Moderate-severe intermittent	167 (25.69)
Moderate persistent	146 (22.46)	Mild persistent	124 (19.07)
Severe persistent	36 (5.53)	Moderate-severe persistent	170 (26.15)

We have observed coexistence of allergic rhinitis to that of the asthma. The high prevalence of the co-existence of rhinitis was found in patients with intermittent asthma (88%), mild persistent asthma (80%), and moderate persistent asthma (73%). Lesser prevalence of coexistence

was found in the patients with severe persistent asthma (34%). This implies that the more severe the asthma, the less frequent the prevalence of comorbid rhinitis (P<0.05). A significant positive correlation (P<.0001) was found between the severity of rhinitis and asthma.

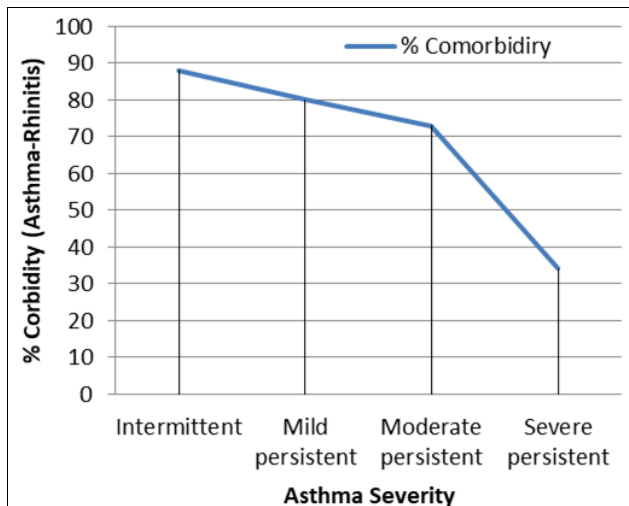


Fig 1: Type of asthma and prevalence of coexistence with rhinitis.

The prevalence of the comorbidity of asthma and rhinitis decreased as age of patients increased ($P < 0.01$). Comorbidity was higher in patients with age groups < 18 years (85%). In 19-40 years old patients prevalence was 67% and in 41-60 years old it was 51%. Minimum rate of prevalence was found in the patients > 60 years old (43%). A family history of rhinitis was a significant risk factor for the comorbidity of rhinitis and asthma. Among 267 subjects with family history of allergic rhinitis, comorbidity was found in 240 patients (90%). Similarly, in smokers ($n=421$) we have found significant comorbidity of asthma and rhinitis in 340 subjects (80%). Presence of pets and animals at home was also found to be significantly ($P < 0.005$) associated with allergic rhinitis-asthma coexistence. However, we do not find any comorbidity of asthma and allergic rhinitis in patients from rural and urban areas. Lung function testing (spirometry) was performed and was within normal limits in 90%. No significant differences were observed in the spirometric parameters between patients with asthma or with asthma and rhinitis simultaneously. Out of the total study population, 78 patients (12%) underwent a skin prick test, of which, nearly 49 patients were sensitized to at least one aeroallergen.

Discussion

This study indicated that the allergic rhinitis coexists with asthma (85%), in the older patients with severe asthma, the prevalence of rhinitis is lower. Other epidemiological studies have reported varying rates of the prevalence of asthma in patients with allergic asthma which ranges from 20% to 70% [20-23]. The prevalence of allergic rhinitis among subjects with asthma also varies in the previous studies. In different studies this is reported from 80%-99% [24, 25]. In the present study, concomitant allergic rhinitis affected 85% of patients with asthma and asthma was found in 75% of the patients with allergic rhinitis. Indeed, rhinitis is the first clinical symptom of chronic allergic respiratory disease that consequently progresses to asthma [17]. Asthma and rhinitis can sometimes start simultaneously, or asthma may even precede rhinitis. In one of the previous studies in rhinitis and asthma, 45% developed rhinitis earlier than asthma, 35% developed rhinitis later than asthma, and 21% experienced both conditions simultaneously [26]. In the present study, 76% of subjects showed allergic rhinitis before or at the same time as asthma. This is similar to reports by Guerra et al.

(76%) [13]. With support of these previous studies, we can suggest that the link between allergic rhinitis and asthma does exist as manifestations of a common inflammatory airway disorder that often occur together during the natural history of the disease.

We have noticed in the present study that the prevalence of rhinitis decreases with age and asthma severity increases. This may be attributed to the fact that rhinitis can subside during the natural history of chronic airway inflammatory disease. Similar observations were noted in previous studies which demonstrated improvement or waning of rhinitis as age increases [27, 28]. Rate of asthma in allergic rhinitis patients was 66% in subjects with age < 60 years and 39% in subjects older than 60 years [24].

Development of asthma is dependent on the severity of rhinitis. People with persistent and severe rhinitis had a risk at least 5 times higher of developing asthma [6]. Allergic sensitization to domestic allergens, aeroallergens, and exposure to trigger factors appears to be an important risk factor in the association between rhinitis and asthma. In this study, the presence of pets and animals at home was found to be two-fold higher in patients with co-existing asthma-rhinitis. Several other studies have also shown a higher frequency of AR-asthma comorbidity in subjects sensitized to pollens and animal dander [29].

Conclusion

We found high prevalence of comorbidity of allergic rhinitis among patients with asthma. Severe form of rhinitis may initiate asthma early than normal patients and in some cases rhinitis precedes or is concomitant with asthma. Such epidemiological studies reinforce the need for early diagnosis and guideline-based management of allergic rhinitis in patients with asthma.

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