ORIGINAL ARTICLE

ASSOCIATION OF ALLERGIC RHINITIS WITH GENDER AND ASTHMA

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Background: Allergic rhinitis and asthma are chronic inflammatory conditions of airways sharing common pathophysiology. The two disorders have similar cellular responses, with different symptoms based on the differences in the physical structures involved. Studies have shown that allergic rhinitis has a major impact on asthma morbidity and that treating allergic rhinitis may also impact asthma control. The objective of this study was to determine association of allergic rhinitis with gender and asthma. **Methods:** In this cross-sectional study, 100 patients with allergic rhinitis and equal number of patients without allergic rhinitis were included. Patients were excluded if they were smokers or if they had respiratory infection within the month preceding the study. Allergic rhinitis was diagnosed on history, nasal smear and blood complete picture. In both groups, patients having asthma, pre-diagnosed by the physician were isolated and their frequency was calculated. **Results:** Ninety-two male and 108 female patients with mean age 30.72±12.58 were included in the study. Odds ratio for allergic rhinitis patients and asthmatics was 5.05 (p<0.05). Association of allergic rhinitis with gender was also statistically significant (p<0.05). Multiple regression analysis showed predictability of allergic rhinitis from asthma at p<0.05. **Conclusion:** Allergic rhinitis is significantly associated with gender and asthma.

Keywords: allergic rhinitis, asthma, united airways disease hypothesis

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INTRODUCTION

Allergic rhinitis and Asthma are chronic inflammatory conditions of airways sharing common patho-physiology.[1] Various epidemiological studies have reported co-morbidity between the two disorders.[2] Although allergic rhinitis seems to be a trivial disease, it has been proven to be a major health problem worldwide. The link between allergic rhinitis and asthma has long been of interest to physicians as clinically, both the diseases are triggered by many of the same environmental allergens.[3] The united airways disease hypothesis suggests that disorders affecting the upper airways producing nasal inflammation are likely to affect the lower airways resulting in bronchial inflammatory responses.[4] The similarities between allergic rhinitis and asthma in epidemiologic and pathophysiologic features suggest that allergic rhinitis and asthma represent the same syndrome, the chronic allergic respiratory syndrome.[5] This co-morbidity between allergic rhinitis and asthma was investigated by many researchers in different parts of the world. Asthma has several common characteristics with allergic rhinitis. In addition, asthma is more common among allergic rhinitis patients, and it is a recognised risk factor for development of asthma in adults and in children.[6] Therefore, it has been suggested that both conditions would be different manifestations of a common pathogenic phenomenon of airways, representing a continuum of the same illness.[7]

Pathophysiologically, these two disorders have similar cellular responses, with different symptoms based on the differences in the physical structures involved. Type 2 helper T cells (Th2), lymphocytes, mast cells and eosinophils are known to infiltrate the mucosal layer of the upper and lower air ways in both the disorders.[8] Both allergic rhinitis and asthma share a similar respiratory epithelial structure of ciliated pseudo-stratified columnar epithelium with goblet cells.[9] During the early-phase response, symptoms in patients with AR typically consist of sneezing, rhinorrhea and conjunctivitis whereas patients with asthma experience wheezing, coughing and shortness of breath, in addition to objectively demonstrable changes in lung function. There is a similar pattern and time course of early and late phase responses in allergic rhinitis and asthma.[10]

The link between allergic rhinitis and asthma has been extensively studied. About 20–40% of patients with allergic rhinitis are reported to have asthma, and 30–90% of patients with asthma have allergic rhinitis.[11] Large variation in frequencies is supposed to be due to differences in study designs and geographical distribution. Allergic rhinitis is also a risk factor for developing asthma, and a number of studies have shown that allergic rhinitis usually precedes asthma in affected patients.[12] Studies have also shown that allergic rhinitis has a major impact on asthma morbidity and that treating allergic rhinitis may also impact asthma control.[13] We planned this study to determine the association of allergic rhinitis with gender and asthma.

MATERIAL AND METHODS

The study was conducted at Combined Military Hospital Chunian from January 2011 to July 2012. It was a descriptive cross sectional study and the patients were recruited by convenience sampling. Patients of all ages and either gender attending the Outpatient Department of ENT were included.

One hundred patients with allergic rhinitis and equal number of patients without allergic rhinitis were included in the study. Patients were excluded if they were smokers or if they had respiratory infection within the month preceding the study. After recording complete history a full clinical examination was carried out and then nasal smear and blood samples were sent to laboratory to determine eosinophil count. Allergic rhinitis was diagnosed on history, nasal smear and blood complete picture. Sneezing, rhinorrhea and itching were the cardinal clinical features of allergic rhinitis. Eosinophilia on nasal smear and blood complete picture confirmed the diagnosis of allergic rhinitis. In both the groups, patients having asthma, pre-diagnosed by the physician were isolated and their frequency was calculated.

The data were analysed using SPSS-21. Continuous variables were presented as Mean±SD and categorical variables as frequencies. Association between categorical variables was determined using Chi-square test. Odds ratio was calculated using 2×2 contingency tables. To calculate a trend in the prevalence of allergic rhinitis according to age, gender and asthma, multiple linear regressions was applied and $p<0.05$ was regarded as statistically significant.

RESULTS

Ninety-two male and 108 female patients with mean age 30.72±12.58 were included in the study. Table-1 is a 2×2 contingency table showing odds ratio of 5.05 for allergic rhinitis patients and asthma. The association is significant ($p<0.05$). Effect of gender on allergic rhinitis is statistically significant ($p<0.05$) (Table-2). A multiple regression model was used to predict allergic rhinitis from independent variables like age, gender and asthma. The regression coefficient was statistically significant for asthma ($p<0.05$) (Table-3).

Table-1: Association of allergic rhinitis with asthma

		Asthma		OR	*p*
		Present	Absent		
Allergic rhinitis	Present	21	79	5.05	0.001*
	Absent	5	95		

Table-2 Association of allergic rhinitis with gender

		Allergic rhinitis		OR	*p*
		Present	Absent		
Gender	Male	39	53	1.8	0.032*
	Female	61	47		

Table-3: Effect of asthma, gender and age on allergic rhinitis

Independent variables	Regression coefficient (β)	SE	*p*
Asthma	0.216	0.102	0.002*
Gender	0.117	0.070	0.096
Age	-0.052	0.205	0.458

DISCUSSION

The present study confirmed the co-morbidity of allergic rhinitis and asthma.[14] Both diseases are part of body's immune response to an identified foreign substance.[10] There is an epidemiological connection of increasing prevalence, shared quality of life issues and significant co-morbidity; often with allergic rhinitis as a precursor to asthma.[15] Pathophysiologically, cellular responses in both the conditions are same with different symptoms based on the differences in the physical structures involved. Both disorders exhibit the inflammatory cascade and eosinophil infiltration of the nasal and bronchial epithelium.[16]

In our study 21% patients with allergic rhinitis had asthma whereas in the group without allergic rhinitis only 5% had the same problem. Our study showed significant association between allergic rhinitis and asthma. The results are comparable with studies carried out in other parts of the world. Alsamarai AM *et al* studied 3,252 patients to observe association of allergic rhinitis with asthma in Iraqi population.[17] They found that in allergic rhinitis group 51% patients (n=1,682) had asthma whereas in non-allergic rhinitis group only 5% patients (n=1,570) had this co-morbidity. The Odds ratio in their study was 23 ($p=0.0001$). Difference in frequency of asthmatic patients and value of odds ratio may be due to differences in sample size, duration of study or genetic makeup as our study population was from a different racial group. Nonetheless, results of the two studies are similar. Polosa R *et al*[18], carried out a cohort study to establish relation of asthma in adults with Allergic Rhinitis. In their study 46% patients (n=153) with allergic rhinitis and 7.7% without allergic rhinitis had asthma. Difference in frequency of asthma cases in allergic rhinitis group may due to different study design or different racial and geographical factors. In another cross-sectional study, Padilla J *et al*[19], found statistically significant association of allergic rhinitis with asthma ($p=0.001$). Results of their study are similar to that of ours.

Results of our study showed that frequency of allergic rhinitis was significantly different in both the genders. Barrenas F *et al*[20] carried out a study to determine effects of gender on allergic rhinitis. Their results were similar to our study as they also found gender differences in patients with allergic rhinitis. Osman M *et al*[21] also studied the effects of gender on asthma, allergic rhinitis and eczema in a primary health care centre. They also found gender specific differences in these diseases.

Allergic rhinitis and asthma are both chronic inflammatory diseases of the upper and lower airways,

and the cells mainly responsible for causing this inflammation are eosinophils. Bronchial hyper-responsiveness is common in people with allergic rhinitis, even if they have no asthma symptoms and asymptomatic airway hyper-responsiveness is associated with increased risk for developing asthma. Bronchial inflammation can result from nasal allergen challenge in patients with allergic rhinitis even in the absence of obvious asthma.[22]

CONCLUSION

The current study concludes that allergic rhinitis is strongly associated with asthma and gender. Considering association of allergic rhinitis with asthma it is recommended that therapeutic approaches should focus on treating the whole problem not a part of it.

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