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Allergic Rhinitis: A neglected disease — A community based assessment among adults in Delhi

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Abstract

Background and Objectives:

Allergic Rhinitis is rather erroneously viewed as a trivial disease. It is important in that it can significantly affect quality of life. There is paucity of community based prevalence studies on the disease in India. This study was planned to assess the prevalence of allergic rhinitis in adults, the proportion of asthmatics among them, risk factors associated and treatment seeking behaviour among the patients.

Materials and Methods:

A community based cross sectional study was conducted in Mehrauli, South Delhi among 1200 adults, aged 30 years and over selected by systematic random sampling from two randomly selected wards. A pre-tested questionnaire was used to collect information regarding symptoms, risk factors and treatment seeking behaviour. Allergic Rhinitis was diagnosed as per ARIA guidelines. Spirometry was done to diagnose asthma among them. Multivariate logistic regression analysis was done to find the association of risk factors with disease.

Results:

The prevalence of Allergic Rhinitis was found to be 11% (132 subjects) and 33.3% (44 patients) among them also had asthma. Overcrowding (aOR = 6.4), absence of cross-ventilation (aOR = 2.5), occupational exposure to dust/smoke (aOR = 2.1), tobacco smoking (aOR = 2.1), family history of allergic diseases (aOR = 2.7) and clinical allergy (aOR = 10.2) were found to be independent risk factors associated with Rhinitis. More patients of Rhinitis with asthma (75%) took treatment, relative to those without asthma (40%) who, mostly relied on home remedies (42%) or, did not seek any treatment (18%) ($P = 0.031$).

Interpretations and Conclusion:

The burden of Allergic Rhinitis is high with a considerable overlap with asthma. These allergic diseases and emphasize the importance of early and regular treatment.

KEY WORDS: Allergic Rhinitis, prevalence, risk factors, treatment seeking behaviour

Introduction

Allergic Rhinitis (AR) is defined as inflammation of the membranes lining the nose, and is characterized by nasal congestion, rhinorrhea, sneezing, itching of the nose and/or post-nasal discharge.[1] It is often viewed, as a trivial disease but can significantly affect the quality of life (QOL) by causing fatigue, headache, sleep disturbances and cognitive impairment.[2] Allergic Rhinitis is also closely related to asthma and, 10-40% of people with rhinitis have concomitant asthma.[2] According to WHO (2007), the global burden of allergic rhinitis was estimated to be 400 million[3] and the prevalence among adults ranges between 10% and 32% in Asia Pacific region.[4] Despite the high burden, there is paucity of community based studies in India, determining the burden and factors associated with allergic rhinitis. This study was therefore planned to find the prevalence of allergic rhinitis, the proportion of asthmatics among them, associated risk factors and treatment seeking behaviour of the people living in an urban community in Mehrauli, located in South Delhi.

Materials and Methods

Ethics

The study protocol was approved by the Institutional Ethics Committee and written informed consent was taken from all participants.

Case definition of Allergic rhinitis

The subjects were considered positive for Allergic Rhinitis as per ARIA (Allergic Rhinitis and its Impact on Asthma) guidelines[5] i.e. if they had two or more symptoms out of - watery runny nose, nasal itching, nasal obstruction or sneezing; lasting for at least one hour per day; for 4 days or more per week and also for 4 or more weeks in past 12 months.

Study design, period and setting

The community based cross-sectional study was conducted during January to December 2012, in Mehrauli, an urban field practice area under Lady Hardinge Medical College, New Delhi. The area comprises of 8 wards with a total population of 1.26 lakhs mostly belonging to lower middle and upper lower socio economic class (according to modified Kuppuswamy scale 2012).[6]

Sample size and sampling technique

The study sample was calculated to be 1200 adults, aged 30 years and above, considering 12% prevalence of allergic rhinitis based on a previous study in Delhi[7] and an absolute error of 2%. Multistage sampling technique was used to select the subjects. Initially two of the eight municipal wards were selected using simple random technique (lottery method), having a total population of 34340 and 12067 respectively and that of 30 years and above was 14010 and 4923 respectively. Proportionate samples, 897 from the former ward and 318 from the latter were selected by systematic random sampling using probability proportionate to sample size.

Study instrument

A semi-structured questionnaire was developed based on the European Community Health Respiratory Survey (ECHRS) and the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire modified as per ARIA guidelines to diagnose allergic rhinitis in adults. For content validity, one expert in the field of respiratory medicine and two experts in the field of public health were consulted to ensure that the questions were appropriate with the study objectives, clarity of the wording, likelihood that the target audience would be able to answer the questions, and the layout and style. The questionnaire was first pretested in 50 adults in Kalyanpuri, an urban resettlement colony located in East Delhi, approved by the Institutional research committee and then was used for the study. It was used to collect relevant information regarding demographic profile, symptoms and risk factors of Allergic Rhinitis (viz. smoking status; environmental tobacco smoke exposure; occupational exposure to dust/smoke/gas; biomass fuel use and history of clinical allergy).

Study procedure

Home visits were made by the researcher and his team and of the 1215 individuals enrolled, 12 (1%) subjects either refused consent or could not be contacted. A total of 1203 were finally interviewed. If a house was found locked, a second visit was made before excluding it.

Diagnosis of asthma

The subjects diagnosed with Allergic Rhinitis were also investigated for the presence of Asthma on the basis of symptoms and spirometry. Spirometry was done as per American thoracic Society (ATS) and European Respiratory Society (ERS) standards[8] in the field using a portable spirometer “Spirocheck” (Morgan Ltd., Rainham Gillingham Kent England) and the predicted spirometric values for Indians was adopted as per the Pulmonaria group recommendations.[9] Asthma was confirmed by lung function measurements showing significant post bronchodilator reversibility ($>12\%$ and 200 ml) in 1st second forced expiratory volume (FEV₁) 15 minutes after 400µg salbutamol delivered by a metered dose inhaler with spacer as per GINA guidelines.[10] The portable spirometer was pretested and standardised in LRS pulmonary function test lab and was found to be 87.5% sensitive and 80% specific in diagnosing Asthma as compared to the lab results.

Post study procedures

All participants diagnosed with asthma were referred to the pulmonology department for further management.

Evaluation of co-morbid conditions

Smokers were classified into ever-smoker (more than 100 cigarettes/bidis in his/her lifetime) and non-smoker.[11] Environmental tobacco smoke exposure (ETS) was established from history of presence of one or more smoker at home or workplace. The duration of exposure was also recorded. Clinical allergy was considered to be present if the subject had any personal history of atopic features i.e. coryza, skin rashes/eczema or itchiness of eyes. Treatment seeking behaviour (mode and place of treatment, reasons for non-initiation, change and discontinuation of treatment) of the patients was also recorded.

Statistical analysis plan

Data was analyzed by SPSS (Statistical Package for Social Sciences) version 17. Percentages and proportions were used for categorical data. Continuous data was expressed using measures of central tendency. Chi square test was applied to find out the association of different factors with allergic rhinitis. Adjusted Odds Ratio (aOR) was calculated by multivariate logistic regression analysis for each potential explanatory variable viz. age, sex, socioeconomic status, overcrowding, crossventilation, biomass fuel use, smoking, ETS exposure, occupational exposure, clinical allergy, family history of allergic disorders (independent variables) either significant in univariate analysis or assumed to be significant clinically to find out the independent association of risk factors with allergic rhinitis (dependant variable). ROC curve was made to assess the predictability of the explanatory variables to predict allergic rhinitis.

Results

Demographics

The age of the study subjects ranged between 30 to 85 years with a mean (SD) of 46 ± 13 years. Two third of the study subjects were in the age group 30 to 49 years and 8.4% were above 70 years of age [Table 1]. Out of the total study subjects, 647 (54%) were men and 556 (46%) were women, mainly belonging to the upper lower (45%) and lower middle (34%) socio-economic classes (According to Modified Kuppuswamy Scale, CPI 2012. Majority (86%) of the study subjects were literate, 45% of them were educated up to high school and above. Among the men, 96% were employed, mostly in professional/semi-professional work (27%) or, clerk/shopkeeper/farmer (21%) or, semi/unskilled work (32%). Eighty percent of the women were housewives.

Allergic rhinitis

This was diagnosed in 132/1203 participants. (11%; 95% CI 9.3, 12.8) Watery runny nose was the most common symptom present in 128 subjects (97%), followed by nasal itching (88%), nasal obstruction (74%) and sneezing (33%). Rhinitis was more common in the 50-59 year age group.

Univariate analysis

In univariate analysis, age, gender, socioeconomic status, overcrowding, cross ventilation, biomass fuel use, smoking pattern, quantity of tobacco smoke exposure, occupational exposure, clinical allergy, family history of allergic disorders were found to be significantly associated with AR. More women had rhinitis compared to men (men: Women ratio 0.72). It was also seen to be more common in those living in overcrowded households (defined by >2 persons per room or <110 sq ft. area for 2 persons) or with no cross-ventilation [Table 1]. AR was seen to be significantly more in those exposed to greater quantity of tobacco smoke (expressed in pack-years) however, the substance smoked (bidi, cigarette) and the duration of ETS exposure had no significant association with the disease [Table 2].

Multivariate analysis

Table 3 in multivariate analysis, among socio-demographic variables only age, had statistically significant association with the occurrence of allergic rhinitis. Gender and socioeconomic status had no significant association with disease.

Overcrowding, absence of cross-ventilation, occupational exposure to dust/smoke, smoking pattern, family history of allergic diseases and clinical allergy were found to be independent risk factors significantly associated with rhinitis on multivariate logistic regression analysis. Though the prevalence of Allergic rhinitis was more in those using biomass fuels (13.7%) compared to the LPG (9.7%) users ($P < 0.05$), it was not found to be significant on multivariate logistic regression analysis. Maximum risk of allergic rhinitis was associated with clinical allergy (aOR = 10.2, 95% CI 5.6-18.6).

The predictive probabilities generated through the logistic regression model were used to create a ROC (Receiver Operating Characteristic) model. The ROC showed 80.5% (represented by the area under curve) predictability of the multivariate logistic model for Allergic Rhinitis after considering the potential explanatory variables i.e. age, sex, socio-economic status, ventilation, overcrowding, biomass fuel use, occupational exposure, smoking, ETS exposure, family history of allergic disorders and clinical allergy as the risk factors. According to the findings of the ROC model, any person above the age of 30 years in the study population, of either gender, belonging to any socioeconomic class, living in an overcrowded house with no cross-ventilation, using biomass fuel, smoker by habit irrespective of ETS exposure, and having occupational exposure to dust/fumes, with family history of allergic disorders and clinical allergy has 80% probability of suffering from allergic rhinitis [Figure 1].

Concomitant asthma

Among the subjects with allergic rhinitis, 44 patients (33.3%) were also diagnosed to be suffering from concomitant asthma, showing a considerable overlap between rhinitis and asthma. Six (4.5%) of them had mild asthma and 38 (28.8%) had moderate asthma according to GINA guidelines 2010[10] [Figure 2].

Health care utilization of patients having allergic rhinitis with concurrent asthma ($n = 44$) was found to be better in whom majority (75%) took medical treatment. Whereas, in patients having only rhinitis ($n = 88$), a lower proportion i.e. 40% took medical treatment and many relied on home remedies (42%). 9% of patients having concurrent rhinitis and asthma did not seek any treatment whereas this was much higher (18.2%) in patients having only rhinitis. These differences were statistically significant ($P = 0.031$). The most common reason for not taking treatment was they did not feel sick enough in the former group and could not afford the medications in the later group. Discontinuation of medical treatment was more common in those suffering from only rhinitis (60%) compared to those having concurrent rhinitis and asthma (21%) ($P = 0.016$). The most common reason for discontinuation was relief of symptoms in the former group and recurrence of symptoms inspite of taking medications in the later group.

Discussion

Allergic rhinitis is now a recognized global health problem[12] and impairs Quality of Life (QOL) in adults[13,14,15] in context of work productivity. Though rhinitis is often considered as a trivial condition, the overall impairment on work productivity may be similar to the health conditions that have been traditionally considered as being more severe from a medical perspective.[16] The disease affects both children and adults, but data regarding its burden in adults and risk factors particularly in community setting in India is limited, hence, this study was planned to find the prevalence of allergic rhinitis in adults.

In epidemiologic settings of large populations, considering the difficulty to obtain the laboratory evidence of immune response by positive skin prick test, questionnaire method, which is also the most common methodology for assessing the burden of disease in community based studies[2] was used in this study. The prevalence of allergic rhinitis is seen to vary due to the use of varied definitions, study designs and different time (season), place and the age groups studied. In a European study among general population using ARIA definition for diagnosis, the prevalence of allergic rhinitis was found to be around 25% in adults ranging from 17% (Italy) to 28.5% (Belgium).[17,18] In Asia Pacific region (2008), the reported prevalence of allergic rhinitis ranged from 10 to 32% in adults.[4] Results from the ISAAC study (1996) showed that Indian children aged 13-14 years had an overall 10% prevalence of allergic rhinitis while, those in Delhi had a prevalence of 11.6%.[19] We found prevalence of allergic rhinitis to be 11% in adults, which was slightly lower than questionnaire based study in Delhi[7] among adults where the prevalence was estimated to be 11.7%. Considering the limitations of the cross-sectional study design, it was difficult to assess the seasonal pattern of rhinitis; hence by definition we only labelled those having persistent rhinitis as the cases.

Epidemiologic studies[20,21,22] have consistently shown that asthma and rhinitis often coexist due to the similarities in the nasal and bronchial mucosa, and the prevalence of asthma in patients with rhinitis varies from 10% to 40%. In the current study, we found one-third of the rhinitis patients were suffering from concomitant asthma. These patients need special attention because the coexistence appears to impair asthma control causing more asthma-related hospitalizations, frequent absence from work and decreased productivity.

The mean age (45 ± 12 years) of the subjects with allergic rhinitis was similar to the multi-centric study[23] in Hongkong (44 ± 15) but interestingly, the subjects who were suffering from concomitant asthma and rhinitis had a higher mean age of 50 ± 11 years. Considering the significant overlap between these two allergic diseases and rhinitis as a probable risk factor for asthma,[5,24] longitudinal follow up studies may be carried out to find whether rhinitis actually progresses into asthma.

Allergic Rhinitis has been consistently observed to be several folds more in the atopic individuals.[2] In our study, clinical allergy was found to be an independent risk factor and the odds to develop rhinitis was 10 times higher in these individuals compared to a survey in Delhi[7] where Rhinitis was three times more common in adults with clinical allergy or atopy. Similar to previous evidence,[2] we also found that history of allergic disorders in a first degree relative is an independent risk factor for rhinitis which points towards an underlying hereditary basis for allergic rhinitis. Existing literature suggests that tobacco smoke generally, does not appear to be allergenic[25,26] but, can alter the mucociliary clearance[27] and can cause an eosinophilic allergy like inflammation in the nasal mucosa of non-atopic individuals[28] with an inconsistent increase in the total and specific IgE.[29,30] Among studies[31,32,33,34] which examined the relationship between tobacco smoke and rhinitis, one study,[34] involving adults in Chile, found smoking to be a significant factor associated with rhinoconjunctivitis. This was similar to our study where we found an independent association between smoking and rhinitis and the smokers had twice the odds to develop allergic rhinitis compared to non-smokers. But, we found no association between environmental tobacco smoke (ETS) exposure and allergic rhinitis, similar to a previous study.[35] Occupational exposure to dust, smoke, fumes and gas was found to be another important factor independently associated to rhinitis. However, exact data on the type and quantity of occupational exposure could not be elicited due to problems in recall and varying occupational patterns which is a limitation of this study. Among the housing conditions, presence of overcrowding and absence of cross ventilation were also seen to have an independent association with the disease. Socioeconomic class and use of biomass fuels were seen to have

no significant association with the disease in multivariate regression analysis. The unique ROC model analysis in this study showed overall predictability of the multivariate logistic model for Allergic Rhinitis.

Data regarding health seeking behaviour in allergic rhinitis patients is limited. Some studies[36,37] have showed AR with concomitant asthma consumed considerable asthma-related health care resources. Findings from the current study show that both, initial treatment seeking and adherence to treatment is higher in those suffering from allergic rhinitis with concomitant asthma than the patients with rhinitis alone and the differences were statistically significant. From these findings it seems that allergic rhinitis is still neglected in the community and gets attention when other complications or asthma sets in. Interestingly, it was also observed that Government health facility was more accessed by the patients having only rhinitis as compared to those suffering from both asthma and rhinitis who accessed private health facility more.

However, it is difficult to generalize the results of this study and therefore to know the country-wide variation in prevalence of allergic rhinitis or to understand the complex inter-relationship of different socio-demographic and environmental factors, similar studies preferably multi-centric, should be conducted in different communities.

Several factors including climate change, increase in industrialization, and the resultant increase in exposure to allergens will affect the future prevalence of allergic rhinitis. The community must be educated about the increasing trends of these allergic diseases, the importance of early and regular treatment to prevent disease related complications and improve quality of life. To increase the awareness in the community, mass campaigns and mass media (TV, Radio, Newspaper) has an important role. Community leaders, mahila mandals, and anganwadis must also participate in community mobilization. Intensive one to one counselling should be done for the patients to help them avoid risk factors like smoking, exposure to dust/fumes and allergen exposure where the allergen can be identified.

Health care resources are not increasing commensurately with the disease burden.[4] Resources can be maximized by increasing the number of physicians trained both in government and private sector, to diagnose and treat allergic diseases through continued medical education and thereby implementing and encouraging compliance with guidelines for the treatment of these diseases.

Footnotes

Source of Support: Nil

Conflict of Interest: None declared.

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Figures and Tables

Table 1

Relationship of socio-demographic and environmental factors to allergic rhinitis

Socio-demographic factors	n	Allergic Rhinitis	Statistical correlates
		No. (%)	
Age in years			
30-39	439	48 (10.9)	P=0.008
40-49	356	34 (9.6)	
50-59	172	32 (18.6)	
60-69	135	10 (7.4)	
≥70	101	8 (7.9)	
Total	1203	132 (11.0)	
Gender			
Men	647	60 (9.3)	P=0.04
Women	556	72 (12.9)	
Socio-economic status (acc. to modified Kuppuswamy Scale, CPI 2012) ^[6]			
Lower & upper lower	552	48 (8.7)	P=0.004
Lower middle & upper middle	637	80 (12.6)	
Upper	14	4 (28.6)	
Environmental factors			
Cross ventilation			
Present	451	33 (7.3)	P=0.007
Absent	728	99 (13.5)	
Overcrowding			
Present	300	69 (23.0)	P=0.000
Absent	903	63 (6.9)	

Table 2

Different risk factors for allergic rhinitis

Risk factors	<i>n</i>	Allergic rhinitis	Statistical correlates
		No. (%)	
Main fuel use			
Biomass fuel	379	52 (13.7)	<i>P</i> =0.03
LPG	824	80 (9.7)	
Smoking pattern			
Ever smoker	459	56 (12.2)	<i>P</i> =0.041
Non-smoker	744	76 (10.2)	
Substance smoked			
Bidi only	301	38 (12.6)	<i>P</i> =0.33
Cigarette only	128	16 (12.5)	
Mixed	30	2 (6.6)	
Quantity of tobacco smoke exposure (pack years)			
No exposure	744	76 (10.2)	<i>P</i> =0.048
≤10	248	28 (11.3)	
11-20	134	17 (12.7)	
>20	77	11 (14.3)	
Duration of ETS exposure (in years)			
No exposure	517	52 (10.1)	<i>P</i> =0.177
≤10	229	16 (7.0)	
11-19	94	6 (6.4)	
≥20	363	58 (16.0)	
Duration of occupational exposure to dust/fumes (in years)			
No exposure	706	62 (8.8)	<i>P</i> =0.000
≤10	190	17 (8.9)	
11-19	66	11 (16.6)	
≥20	241	42 (17.4)	
Family history of allergic disorders			
Present	218	55 (25.2)	<i>P</i> =0.000
Absent	985	77 (7.8)	
Clinical allergy			
Present	108	50 (46.3)	<i>P</i> =0.000
Absent	1095	82 (7.5)	

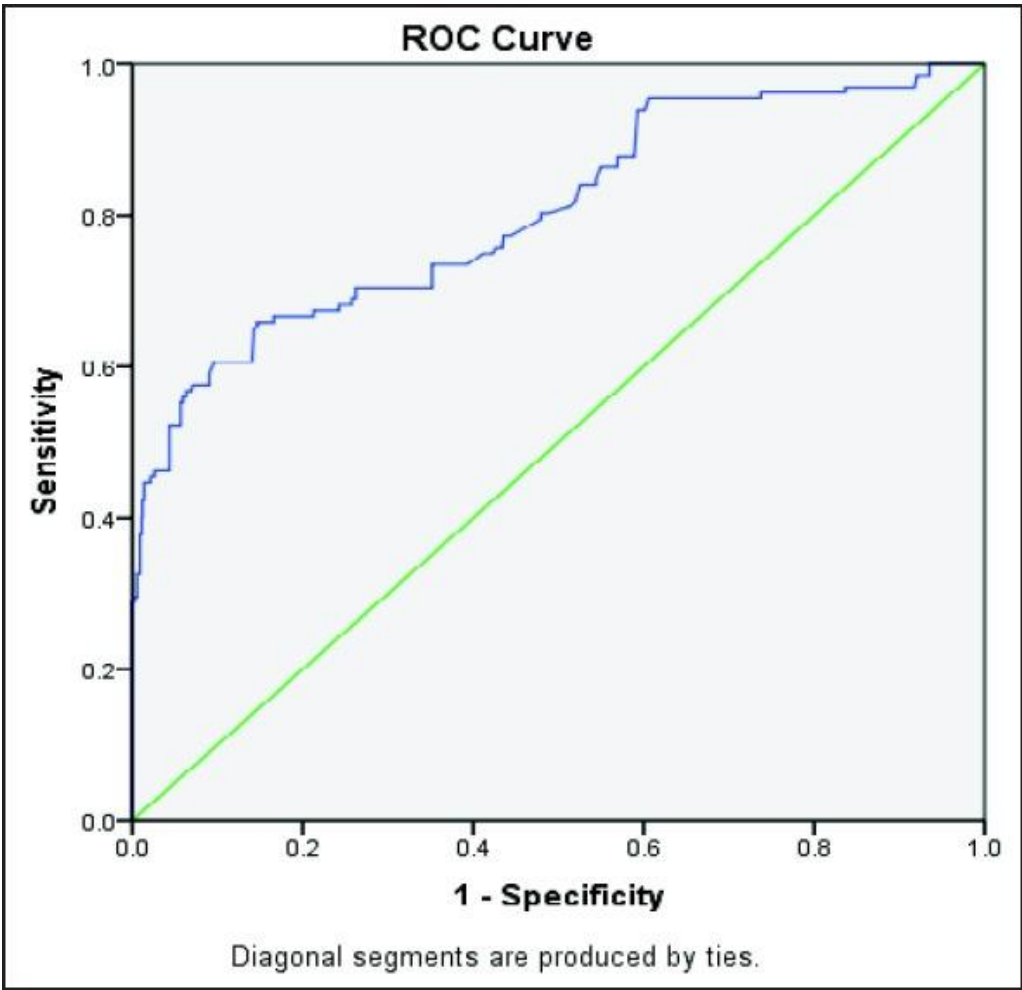
Table 3

Association of Allergic Rhinitis with risk factors (by multivariate logistic regression analysis)

Factors	Rhinitis	
	Multivariate logistic regression analysis	
	aOR [95%CI]	Adjusted <i>P</i> value
Age (in years)		
30-39	1.000 (Reference)	
40-49	1.171 (0.675-2.029)	0.575
50-59	0.929 (0.469-1.842)	0.833
60-69	0.243 (0.094-0.627)	0.030
≥70	0.578 (0.213-1.568)	0.282
Sex		
Male	1.000 (Reference)	
Female	1.423 (0.865-2.339)	0.165
Socio-economic status		
Lower	1.000 (Reference)	
Upper	4.179 (0.585-29.85)	0.154
Upper Middle	3.754 (0.850-16.58)	0.081
Lower Middle	1.994 (0.513-7.753)	0.319
Upper lower	0.411 (0.119-1.412)	0.158
Cross ventilation		
Present	1.000 (Reference)	
Absent	2.491 (1.387-4.475)	0.002
Overcrowding		
Absent	1.000 (Reference)	
Present	6.376 (3.653-11.13)	0.000
Biomass fuel use		
Absent	1.000 (Reference)	
Present	1.294 (0.765-2.189)	0.337
Smoking pattern		
Non-smoker	1.000 (Reference)	
Ever-smoker	2.152 (1.267-3.654)	0.005
Environmental Tobacco Smoke (ETS) exposure		
Absent	1.000 (Reference)	
Present	0.704 (0.420-1.181)	0.183
Occupational exposure		
Absent	1.000 (Reference)	
Present	2.156 (1.323-3.511)	0.002
Clinical allergy		
Absent	1.000 (Reference)	

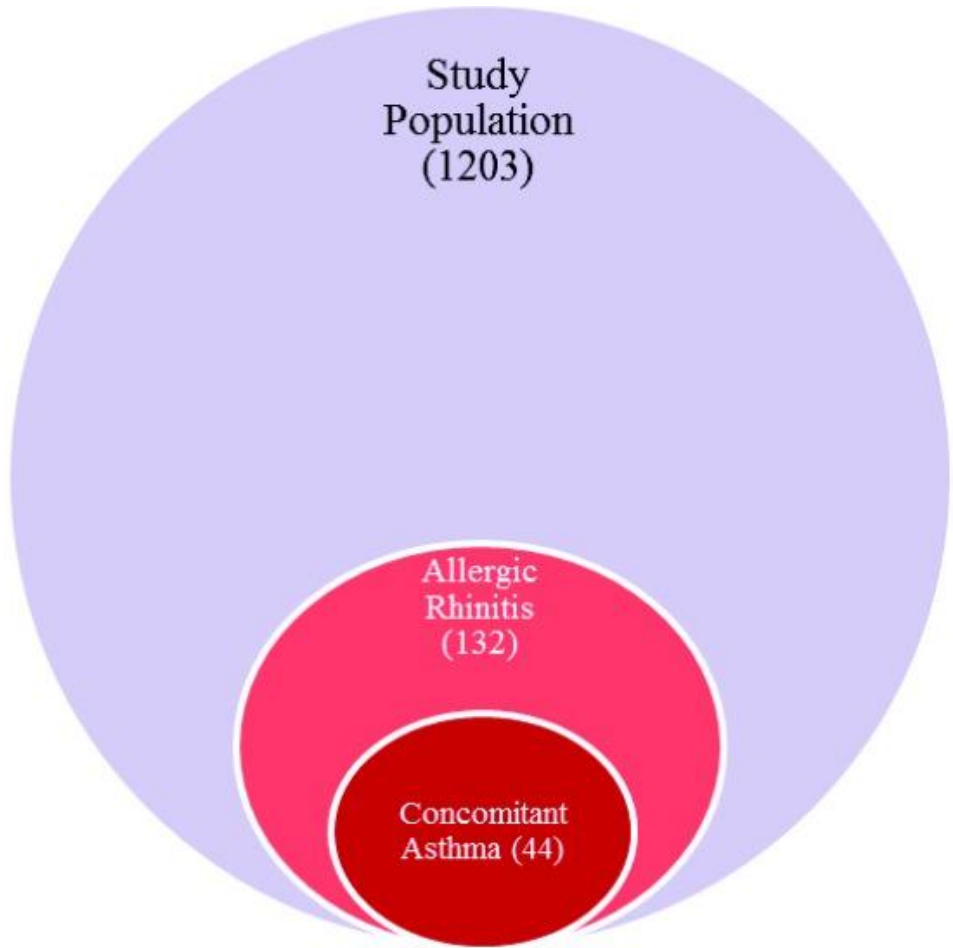
Factors	Rhinitis	
	Multivariate logistic regression analysis	
	aOR [95%CI]	Adjusted <i>P</i> value
Present	10.186 (5.575-18.61)	0.000
Family history of allergic disorders		
Absent	1.000 (Reference)	
Present	2.707 (1.614-4.542)	0.000

Figure 1



ROC curve between risk factors and allergic rhinitis. Area under curve = 0.805, $P = 0.000$

Figure 2



Distribution of allergic rhinitis and concomitant asthma in the study population

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