

A STUDY OF ALLERGENS AND THEIR ROLE IN RESPIRATORY COMPLICATIONS IN THE PRACTICE OF ENT

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ABSTRACT

BACKGROUND

Mucosal epithelial cells which line the upper respiratory passage are affected by the acute allergic reactions. The interactions that take place between the allergens and the surface are complex and involve the autonomic nervous system and the mediators produced by the underlying tissues in response to allergens. Mucous glands which have goblet cells in the epithelium are induced to secrete mucus and the mucus genes are induced in the ciliated epithelium. This caused mucous metaplasia and hyperplasia. Thus, repeated and prolonged exposure leads to structural changes and enhanced mucous production. The tissues will be washed with cytokines and other inflammatory mediators which cause classical pictures of asthma. Structural abnormalities that are commonly encountered in the practice of ENT are sinusitis and nasal polyps. The sinusitis is caused by prolonged inflammation of the mucosa and thus excess production of the mucus and this leads to the obstruction of the natural drainage. Nasal polyp is oedematous and hypertrophied mucosal and submucosal tissue presenting as a mass lesion.

A sincere effort has been made to find out the common allergens that cause the respiratory complications in the practice of ENT. This study is intended to help the fellow ENT practitioners to identify the commonly associated allergens and thus take immediate actions in diagnosing and treating the patient that present in complications in OPD.

METHODS

This study was conducted in the Department of ENT, Kilpauk Medical College. The study was conducted from 2012 to 2014.

320 cases were studied in the Department of ENT. Mean age of the study population was 31.11 years with a standard deviation of 11.739.

RESULTS

In this study, the mean age of the study population was 31.11 years with a standard deviation of 11.739. The most common presentation was rhinitis along with sinusitis. Family history was found to be not significant. Dust allergy to exposure was significant. Out of the various allergens, only mutton and prawns exposure were found to be the statistically significant predictors of respiratory conditions ($p < 0.05$).

CONCLUSION

The most common allergen that caused the upper respiratory tract pathology in this study has been identified successfully. This study forms a platform for many more studies in the near future so that more and more allergens which are significantly related can be found and affectively dealt with. Being in a country like ours where people carry out different customs and are exposed to a plethora of allergens, it is the need of the hour to identify the allergen and properly deal within the local environment.

KEYWORDS

Allergen, Respiratory, ENT, Sinusitis, Polyp.

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INTRODUCTION: Allergy is known to cause a vast variety of illness which also affects a single organ system in different range of exhibition. It can be defined as inappropriate activation of the immune system. Allergy mostly affects the

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body's interface with the environment or in other words affects the part of the body which comes in contact with the environment. The common parts are the skin, respiratory system, GI tract and conjunctiva. But any organ in the human body can be affected when the reaction involves the microvasculature. Patients claim allergy to hair spray, disinfectants, paint, common food like milk, prawns, mutton. Dust allergy is complained in majority of the cases. The common vegetables are known to cause allergy. Sneezing and cough reflex are the most common responses to airway irritation. These manifestations are known to be seen in acute allergic reactions. But it should always be kept in mind

that not all adverse reactions to food are due to allergy. Although the allergic responses are seen commonly restricted to the area of contact, spread of allergen through blood or lymph can lead to generalised reactions. Each organ responds in its own way. The skin may show signs of urticaria, GI tract causes vomiting or diarrhoea, in respiratory system it may cause blockage of nose, runny nose and sneezing. Prolonged exposure may cause sinusitis or nasal polyps. Lungs may set off asthma by bronchoconstriction. The most severe manifestation is of course is anaphylaxis. It is one of the most difficult thing to diagnose and give treatment in order to prevent its progression. It is fatal because patients go into shock or asphyxia. This shock may be a result of volume redistribution or direct effects of allergens on the heart. The asphyxia may be due to respiratory tract blockage due to allergic reactions.

The nomenclature of allergy, hypersensitivity and intolerance is very often confused and is still controversial. Different terms are used in the United States and Europe. The European/WHO terminology is taken as standard.¹ The most common classification of allergy is IgE mediated and non-IgE mediated. The IgE mediated is also termed as type 1 hypersensitivity and others are divided into type 2, type 3 and type 4.²

Mucosal epithelial cells which line the upper respiratory passage are affected by the acute allergic reactions. The interactions that take place between the allergens and the surface are complex and involves the autonomic nervous system and the mediators produced by the underlying tissues in response to allergens.³ Mucous glands which have goblet cells in the epithelium are induced to secrete mucus and the mucus genes are induced in the ciliated epithelium. This causes mucous metaplasia and hyperplasia.⁴ Thus, repeated and prolonged exposure leads to structural changes and enhanced mucus production. The tissues will be washed with cytokines and other inflammatory mediators which causes classical pictures of asthma.⁵ Structural abnormalities that are commonly encountered in the practice of ENT are sinusitis and nasal polyps. The sinusitis is caused by prolonged inflammation of the mucosa and thus excess production of the mucus and this leads to the obstruction of the natural drainage. Nasal polyp is oedematous and hypertrophied mucosal and submucosal tissue presenting as a mass lesion. Clinically, there are two types of polyps. If the hypertrophied oedematous mucosa of maxillary sinus prolapses in the nasal cavity to present like a mass it is called antrochoanal or intranasal. On the other hand, the mucosa of the ethmoid sinus can present as a polyp. However, if the polyp does not present externally in the nose but is visualised on X-ray inside the maxillary sinus it is called antral polyp. Polypoid changes can be appreciated on the mucosa of turbinates as well.

The basic cause of polyp is the allergic inflammation. The normal respiratory mucosa is effected by the allergens. The normal epithelia undergo metaplasia to squamous epithelium. The submucosa becomes infiltrated with eosinophils and chronic inflammatory cells and subsequently balloons out due to collection of serous fluid. The polyp is

seen as a pale white mass and there will be no associated history of bleeding. It does not bleed on palpation. In case of associated infection, it can present as reddish mass. The association of recurrent allergic reactions pinpoint the diagnosis. The status of the nasal cavity and paranasal sinus can be checked through the X-ray. Alternatively, a CT scan can be carried out if the polyp is large. The asthma is triggered by the cytokines that are the intermediary molecules that are released by the inflamed tissues. The first antibody belong to the IgM category of antibodies. The genes for immunoglobulin heavy chains are strung along the heavy chain locus on chromosome 14 with the V genes at the 5 end. Many other factors are involved but the principle among these are the effects of dendritic cells in immunoglobulin class switching.⁶ Many immune responses induce a brief, low volume of IgE production. The difference in the allergic responses is the level and persistence of IgE response. But what causes these is poorly understood. In other words every individual reacts to different allergens differently.

Most of the tissues of the human body can be affected by the allergic responses but the allergic responses shown by the respiratory system still remains by far the most common.

A sincere effort has been made to find out the common allergens that cause the respiratory complications in the practice of ENT. This study is intended to help the fellow ENT practitioners to identify the commonly associated allergens and thus take immediate actions in diagnosing and treating the patient that present in complications in OPD.

AIMS AND OBJECTIVES:

1. Age and sex wise distribution of disease.
2. To study the most common respiratory conditions due to allergy.
3. Association of respiratory conditions with family history and dust exposure.
4. Association of respiratory conditions with various allergens.
5. To study the different treatments received.

MATERIALS AND METHODS: This study was conducted in the Department of ENT, Kilpauk Medical College, The study was conducted from 2012 to 2014.

320 cases were studied in the Department of ENT. Mean age of the study population was 31.11 years with a standard deviation of 11.739. The patients were selected on the basis of respiratory complications that they presented in the OPD.

	Mean	Std. Deviation
Age	31.11	11.739
<i>Age of the Population under Study</i>		

Inclusion Criteria: The patients who were confirmed to have an allergic reaction triggered by a particular allergen were selected.

Exclusion Criteria:

1. The patients who were associated with other ENT diseases that mimicked the allergic reactions were not considered.
2. The patients who were already on corticosteroid therapy were not included in the study.

Detailed history of the patient was recorded. The family history of the condition was noted and also the past history was noted.

The patients were given a preformat that included the list of all known allergens and were asked to list the allergens that caused the allergic symptoms.

Frequency of the common allergen was tested for different conditions and the result was tested for significance.

The treatment received for the same condition was noted and the frequency was noted. The treatment consisted of medical line of treatment, immunotherapy and surgical line of treatment.

All statistics were done using the SPSS 2015, California. Only the allergen which consisted of significantly higher association has been reported.

RESULTS:

	Mean	Std. Deviation
Age	31.11	11.739

Mean age of the Study Participants (n=320)

Rhinitis	Rhinitis with Sinusitis	Rhinitis with sinusitis and asthma	Rhinitis with sinusitis and Nasal polyp
56	223	28	13

Table 1: Frequency Distribution of the Disease

Respiratory conditions	Family history		X ² value
	Present (%)	Absent (%)	
Rhinitis	33(17.3)	23(17.8)	2.542
Rhinitis with sinusitis	138(72.3)	85(65.9)	
Rhinitis with sinusitis and asthma	14(7.3)	14(10.9)	
Rhinitis with sinusitis and nasal polyp	6(3.1)	7(5.4)	
	Dust Exposure		X ² value
	Present (%)	Absent (%)	
Rhinitis	25 (17.0)	31(17.9)	8.113
Rhinitis with sinusitis	96(65.3)	127(73.4)	
Rhinitis with sinusitis and asthma	20(13.6)	8(4.6)	
Rhinitis with sinusitis and nasal polyp	6(4.1)	7(4.0)	

Table 2: Association of Respiratory Conditions with Family History and Dust Exposure (n=320)

Respiratory conditions	Mutton		X ² value
	Present (%)	Absent (%)	
Rhinitis	8(50.0)	48(15.8)	12.988
Rhinitis with sinusitis	6(37.5)	21(71.4)	
Rhinitis with sinusitis and asthma	1(6.2)	27(8.9)	
Rhinitis with sinusitis and nasal polyp	1(6.2)	12(3.9)	
	Prawns		X ² value
	Present (%)	Absent (%)	
Rhinitis	7(18.4)	49(17.4)	8.920
Rhinitis with sinusitis	21(55.3)	202(71.6)	
Rhinitis with sinusitis and asthma	8(21.1)	20(7.1)	
Rhinitis with sinusitis and nasal polyp	2(5.3)	11(3.9)	

Table 3: Association of Respiratory Conditions with various Allergens(n=320)

Out of the various allergens, only mutton and prawns exposure were found to be the statistically significant predictors of respiratory conditions (p<0.05).

Procedure	Rhinitis	Rhinitis with Sinusitis	Rhinitis with sinusitis and asthma	Rhinitis with sinusitis and Nasal polyp
Medical	67.85%	53.81%	14.28%	Nil
Immuno therapy	32.15%	18.38%	39.28%	Nil
Surgery	NIL	27.81%	46.44%	100%

Table 4: Cured by Treatment

The other allergens which caused respiratory conditions in their decreasing order of frequency was dog fur, cat fur, peanuts, milk and milk products; vegetables like bottle gourd, ridge gourd, brinjal and finally the least affecting was mustard seeds. Of course these allergens were statistically not significant but have the potential to cause dangerous and serious respiratory allergic manifestations.

DISCUSSION: People are not equally susceptible to allergy. No two individuals have the same allergy patterns nor susceptible to same allergens in the same manner. The study of inheritance suggests a multigenic pattern. But many of the genes in the humans have evolved based on the environmental factors.⁷ Some substances are more likely to cause an allergic response than the other allergens. The allergens are mostly proteins in nature. It has not been proved that possibly what proteins or what protein structure causes the allergic reactions. There have been papers published proving the fact that other factors associated with the initial exposure to the protein do influence the type of

response. An adjuvant is thus present which always alters the immune response. In some mouse models, aluminium hydroxide increases the anaphylactic antibody production.⁸ In humans repeated doses of alum – conjugated allergen extracts are used to suppress IgE mediated allergy.⁹

In this study, the mean age of the study population was 31.11 years with a standard deviation of 11.739. The most common presentation was rhinitis along with sinusitis. Family history was found to be not significant. Dust allergy to exposure was significant. Out of the various allergens, only mutton and prawns exposure were found to be the statistically significant predictors of respiratory conditions ($p < 0.05$).

It is never easy to judge that an acute illness was due to allergy. One of the most trusted thing is the measurement of mediators. But the mediators are often are very unstable and are very difficult to measure. Mast cell tryptase is one measurable factor. Histamine and its metabolites are other markers which can be measured. If the reaction is IgE mediated, the presence of IgE antibodies can be detected by measuring the binding of IgE to allergen extracts or by skin prick test.

The management of acute hypersensitivity patients includes medical line, immunotherapy and surgical approach. The themes of the treatment include allergen avoidance, reduce the risk of severe reaction and rescue from the effects. Prompt treatment of the condition should be carried out.

Some allergens are easily controllable than others. Hyposensitisation by repeated injection of the allergen can be carried out.¹⁰ This is known to reduce the allergy. In case of the anaphylaxis, prompt treatment should be started and checking the patient for sustaining a healthy vital output is the need of the hour.

CONCLUSION: Very few studies have been carried out to know the significant allergens that cause the upper respiratory disorders. This study forms a platform for many more studies in the near future so that more and more allergens which are significantly related can be found and affectively dealt with. Being in a country like ours where people carry out different customs and are exposed to a plethora of allergens, it is the need of the hour to identify the allergen and properly deal within the local environment.

REFERENCES

1. Johansson SG, Hourihane JO, Bousquet J, et al. A revised nomenclature of allergy: an EAACI position statement from the EAACI nomenclature task force. *Allergy* 2001;56(9):813-824.
2. Gell PGH, Coombes RRA. *Clinical aspects of immunology*. Oxford, UK: Blackwell 1962.
3. Shimizu T, Shimizu S, Hattori R, et al. A mechanism of antigen induced goblet cell degranulation in the nasal epithelium of sensitized rats. *J Allergy Clin Immunol* 2003;112(1):119-125.
4. Hoshino M, Fujita Y, Saji J, et al. Effects of supalast tosilate on goblet cell metaplasia in patients with asthma. *Allergy* 2005;60(11):1394-1400.
5. Holgate ST, Davies DE, Lackie PM, et al. Epithelial-mesenchymal interactions in the pathogenesis of asthma. *J Allergy Clin Immunol* 2000;105(2 Pt 1):193-204.
6. Bacharier LB, Jabara H, Geha RS. Molecular mechanisms of immunoglobulin E regulation. *International Archives of Allergy and Immunology* 1998;115(4):257-269.
7. Arruda LK, Sole D, Baena-Cagnani CE, et al. Risk factors for asthma and atopy. *Current Opinion in Allergy and Clinical Immunology* 2005;5(2):153-159.
8. Yamanishi R, Yusa I, Miyamoto A, et al. Alum augments the experimental allergenicity of Kunitz-type soybean trypsin inhibitor independent of the antigen absorption. *Journal of Nutritional Science and Vitaminology* 2003;49(6):409-413.
9. Corrigan CJ, Kettner J, Doemer C, et al. Efficacy and safety of preseasonal-specific immunotherapy with an aluminium absorbed six grass pollen allergoid. *Allergy* 2005;60(6):801-807.
10. Golden DBK. Discontinuing venom immunotherapy. *Current Opinion in Allergy and Clinical Immunology* 2001;1(4):353-356.