Common allergens in patients of allergic rhinitis in Gandaki province of Nepal

Rajendra Nepali[1]*, Brihaspati Sigdel[2], Tulika Dubey[3], Neeraj KC[4], Banita Gurung[5], Pravin Baniya[6]

[1]Department of ENT-HNS, Pokhara ENT Centre, Nepal, [2]Department of ENT-HNS, Gandaki Medical college, Pokhara, Nepal, [3]Department of ENT-HNS, Fewacity Hospital, Pokhara, Nepal, [4]Department of ENT-HNS, Metrocity Hospital, Pokhara, Nepal, [5]Department of Pathology, Nepal Cancer Hospital and Research center, Kathmandu, Nepal, [6]Department of Dermatology and Venerology, Charak Memorial Hospital, Pokhara, Nepal

ABSTRACT

Introduction: Atopic disorder is very common globally and in Nepal which has affected quality of life resulting into loss of working and school days. Change in lifestyle is one of the important recommendations for fighting back with allergy, which suggests for avoidance of allergens developing allergic rhinitis. The objectives of the study were to find out common allergic conditions in Pokhara, Nepal and to identify the allergens, which induced IgE mediated disorder. **Methods:** A retrospective study was done among the patients with different allergic disorders who were referred from different specialist clinic attending Pokhara ENT Center at Pokhara from January 2011 to December 2017. The study sample included 1810 patients to find the distribution of various allergic disorders among them. Further, a sample of 430 patients of allergic rhinitis who had undergone skin prick test according to international guidelines were included in order to find out the common allergens among them. Set of allergens included in this study were mites, pollen, fungus, insects, dusts, epithelia-danders, feather & fabric, non-juicy foods, and juicy foods. These nine allergen types further included several allergens. Data were analyzed using descriptive statistics using Stata 15.1. The study was done from after taking ethical clearance from the institutional ethical committee of Gandaki medical college. **Results:** Among various types of allergic diseases, allergic rhinitis accounted for one fourth (23.8%) of the cases. The patients with allergic rhinitis who underwent skin prick test against various allergens were evaluated. Skin prick test positive test result were seen for non-juicy foods (96%), pollens (95%) and then juicy foods (93%). On the contrary, least percentage (13.72%) of people were found positive against feather & fabrics. Radish (7.7%) and snake gourd (6.99%) were only two juicy vegetables against which people were found positive in skin prick test. Among non-juicy foods, tobacco was the commonest allergens which was reported positive in skin prick test of 16% people. Pollen of Zea mays, Azadirachta indica, Mangifera indica and Prosopis juliflora were top allergens diagnosed positive among 12.65%, 10.95%, 7.79%, and 7.54% of people respectively. The mite Dermatophagoides pteronyssinus yielded highest prevalence (69.36%) of positive test. **Conclusions:** Based upon the findings of our study, allergic rhinitis is one of the most common allergic diseases in Gandaki province, Nepal. Patients of allergic rhinitis should be tested for certain allergens which are locally present and they need to modify lifestyle and avoid allergens which can induce IgE-mediated disorder. Further research is needed to establish causation.

Keywords: Allergens, allergic rhinitis, skin prick test.

***Correspondence:**
Dr Rajendra Nepali
Associate Professor, Pokhara ENT Centre, Pokhara, Nepal.
Email: drrajendra28@gmail.com
Phone no: 9856023277

Submitted: January 6, 2022
Accepted: June 14, 2022

To cite: Nepali R, Sigdel B, Dubey T, KC N, Gurung B, Baniya P. Common allergens in patients of allergic rhinitis in Gandaki province of Nepal. JGMC Nepal. 2022;15(1):32-6.
DOI: 10.3126/jgmcn.v15i1.42141

INTRODUCTION

Although the 'Allergy' was introduced by Clemens Von Pirquet (1874-1929), it has become synonymous to the IgE-mediated allergic diseases and has been recognized as a serious global health issue with almost 30% people suffering from allergic disorder.[1,2]

There are two kinds of allergic disorders. Allergic Rhinitis, asthma etc are some of the atopic disorders which have hereditary predisposition to produce IgE antibodies against common environmental antigen. Alternatively, dermatitis and pneumonitis are non-atopic disorders which develops through IgE-independent mechanism.[3,4] Whatever be the type of allergy, it affects quality of life influencing daily activities depending upon its severity grading.[5] Fighting back with allergy may require us to change lifestyle for which it is necessary to have information about local allergens and prevalence of patients affected by these allergens. Indicated test for the diagnosis of this IgE-mediated allergy is Skin Prick test (SPT) which is also accepted as gold standard test for allergy.[6,7] It is already been identified by previous studies that aeroallergens like pollen grains, dusts, mites etc have significant role in the pathogenesis of respiratory allergy, say allergic rhinitis and asthma.[8]

Although related literatures are available in Nepalese context, there is a gap of information regarding specific allergens. For example, one study gives idea of etiology and some major allergen but not about subgroup of allergen.[9] Another article identified subgroup of allergens, but range of allergens selected was very small and many locally available allergens were not included.[10] We hypothesise that pattern of distribution of allergic diseases vary across the country due to variation in climate and locally available allergens. Therefore, this study aimed to assess the distribution of common allergic conditions and to identify the allergens which induced IgE mediated disorder in Pokhara, Nepal.

METHODS

This is a retrospective study which included patients with different allergic disorders attending Pokhara ENT center from January 2011 until December 2017 in Gandaki province, Nepal. The study sample included 1810 patients to find the distribution of various allergic disorders. Further, a sample of 430 patients of allergic rhinitis who had undergone SPT were included in order to find out the common allergens among them. SPT were performed according to international guidelines.[11] The test was done against allergens with histamine-positive and histamine-negative controls which were purchased from Creative Diagnostic Medicare Private Limited (India). Allergens types against which SPT were performed in our study were mites, pollens, fungus, insects, dusts, epithelia-danders, feather & fabric, non-juicy foods, and juicy foods. These nine allergen types further included several allergens. The skin prick reaction was read at 15 minutes and reaction wheal diameter was at least 3 mm larger. This was according to the previous literature which reported that there was no clinical relevance below 3 mm wheal size.[5] Patients who were already on antihistamine and steroids within the period of two weeks were excluded from the study considering liable to affect the skin prick testing. Patients with active skin disorders, dermatographia and with negative skin prick test for all allergens were also excluded. Data was collected after taking ethical clearance from the institutional ethical committee of Gandaki medical college (Ref no: 45/078/079). Data were analyzed using descriptive statistics using Stata 15.1.

RESULTS

Table 1 shows the frequency distribution of various allergic diseases among patients with allergic diseases over the period of seven years revealing that almost one fourth (23.8%) of the patients were clinically diagnosed to have allergic rhinitis.

Table 1: Frequency distribution of various allergic conditions among patients with allergic diseases (N=1810)

Types of allergic diseases	Number	Percentage (%)
Chronic urticarial	451	24.9
Allergic rhinitis	430	23.8
Ocular allergy	358	19.8
Bronchial asthma	334	18.4
Allergic dermatitis	111	6.1
Allergic pharyngitis	86	4.7
Allergic rhinitis with bronchial asthma	40	2.2

Table 2 shows the distribution of positive result of SPT test done against various allergens among patients with allergic rhinitis. It can be seen that patients suffering from allergic rhinitis were sensitive to all the allergen types which we tested. Non-juicy foods were found to be the strongest sinister followed by pollens and then by juicy foods with percentage being approximately 96%, 95% and 93% respectively. On the contrary, least percentage of about 13.72% of people were found positive against feather & fabrics.

Table 2: SPT report against allergens among patients with allergic rhinitis (N=430)

Types of allergens	Number	Percentage (%)
Non-juicy foods	413	96.05
Juicy foods	398	92.56
Pollen	408	94.88
Dust	362	84.19
Mites	346	80.47
Insects	322	74.88
Fungus	265	61.63
Epithelia/Danders	65	15.12
Fabric/feather	59	13.72

Note: Positive reports only shown

Table 3 presents the distribution of SPT positive reports for juicy and non-juicy foods. Fifty different types of juicy foods were tested among 386 patients of allergic rhinitis. But respondents were found positive against 46 juicy foods. Although overall percentage of people reporting positive against juicy foods were high, most of the juicy foods were found to be allergic in less than one percent of those who underwent SPT. Radish (7.7%) and snake gourd (6.99%) were only two juicy vegetables against which people were found positive in SPT. Among non-juicy foods, tobacco was the commonest allergens which was reported positive in SPT of 16% people. Some of the subsequently following allergic non-juicy foods were sesame seeds (6.59%), dalmoth (6.59%), coriander (6.59%) and tea (6.34%). Conversely, pea, barley, arhar dal, and wheat were found to be the safest non-juicy food comparatively with almost 0.24% people showing positive in SPT.

Table 3: Distribution of SPT positive reports for juicy foods (n=386) and non-juicy foods (n=410)

Juicy foods (%)				Non-juicy foods (%)			
Banana	0.52	Ginger	1.3	Pea watana	0.24	Coconut	0.98
Cheese	1.04	Grape	0.78	Barley	0.24	Coffee	2.44
Fish sardine	0.52	Guava	1.55	Cashewnut	0.49	Cumin seeds	4.63
Fish salmon	0.52	Lady's finger	1.81	Corn	0.73	Dalmoth	6.59
Garlic	0.52	Lemon	3.11	Dal arhar	0.24	Coriander	6.59
Lobster	0.26	Mango	4.66	Dal masoor	0.73	Methi	5.37
Milk	0.26	Meat beef	1.3	Dal moong	1.22	Papad	5.12
Onion	0.26	Meat chicken	4.4	Dal urad	0.98	Pista	5.61
Prawn	1.3	Meat mutton	3.11	Gram kabuli	0.49	Rajma	4.39
Pumpkin	0.78	Mint	3.37	Mustard	1.22	Seasame seeds	6.59
Tomato	0.78	Mushroom	2.59	Peanut groundnut	1.22	Tea	6.34
Apple	0.52	Orange	0.78	Soyabean	0.73	Tobacco	16.1
Bitter gourd	1.04	Papaya	3.37	Turmeric	1.95		
Brinjal	0.78	Parbal	5.7	Walnut	1.22		
Butter	1.04	Peach	3.89	Wheat	0.24		
Cabbage	1.3	Potato	3.11	Yeast	1.22		
Capsicum	1.3	Radish	7.77	Cinnamon	1.22		
Carrot	1.55	Snake gourd	6.99	Aginomoto	1.46		
Cauliflower	2.33	Spinach	3.89	Almond	2.44		
Crab	3.63	Strawberry	3.37	Blackpepper	1.95		
Cucumber	0.26	Sweet gourd	1.55	Cardamom	2.2		
Curd	1.3	Sweet potato	1.55	Chilli powder	3.66		
Dalda	1.55	Watermelon	2.85	Chocolate	1.71		
Eggs whole	3.89			Clove	1.46		

Table 4 depicts the distribution of SPT positive reports for pollens and fungus. In our study, 411 patients underwent SPT against 32 allergens of pollen type. Zea mays, Azadirachta indica, Mangifera indica, and Prosopis juliflora are the pollens which were found to be positive allergens among 12.65%, 10.95%, 7.79%, and 7.54% of people undertaking SPT respectively. Similarly, the table also reveals the SPT reports for 15 different fungus tested over 260 patients which shows the top five fungus type allergens were Fusarium solanii (16%), Candida albicans (13%), Tricoderma (11%), Penicillium (8.85%), Phoma tropicalis (8.46%).

Table 4: Distribution of SPT positive reports for pollens (n=411) and fungus (n=260)

Pollen (%)				Fungus (%)	
Acasia Arabica	0.24	Eucalyptus sp	1.95	Alternaria alternata	1.15
Ageratum conyzoides	0.97	Holoptelea integrifolia	0.97	Aspergillus flavus	1.92
Ailanthus excelsa	0.73	Ipomoea sp	2.92	Aspergillus fumigatus	0.77
Amaranthus spinosus	0.97	Ischaemum indicum	3.65	Aspergillus niger	0.38
Argemone Mexicana	0.97	Mangifera indica	7.79	Aspergillus tamarii	4.23
Brassica nigra	2.19	Parthenium hysterophorus	5.35	Aspergillus versicolor	4.62
Carica _papaya	0.97	Peltophorum pterocarpum	4.38	Candida albicans	13.08
Cassica siamea	0.24	Pennisetum typhoides	2.92	Clodosporium herbarum	6.92
Casuarina equisetofolia	0.97	Prosopis juliflora	7.54	Curvularia lunta	8.46
Cenchrus barbatus	0.49	Putranjiva roxbrghii	3.16	Fusarium solanii	16.15
Chenopodium album	1.46	Ricinus communis	2.43	Helminthosporium sp	8.46
Chenopodium murale	2.19	Sorghum vulgare	1.7	Penicillium	8.85
Cocos nucifera	1.22	Typha angustata	4.62	Phoma tropicalis	8.46
Cynodon dactylon	3.16	Xanthium strumarium	5.11	Rhizopus nigricans	5.77
Cyperus rotundus	2.19	Zea mays	12.65	Tricoderma	10.77
Dodonea viscosa	1.46	Azadirachta indica	10.95		
		Cassia occidentalis	1.46		

Certain insects also cause release histamines. Allergy test via SPT were done for 12 type of insects over 325 patients. Approximately, 34%, 14% and 13% of people were found allergic to Rice weevil, moth and wasp respectively. Mosquitoes and cockroaches come next sensitive among 8% and 7% people respectively. Mites have also been found sensitive among huge number of people. For example, D pteronyssinus was found sensitive among 69.36% of 346 patients undergoing SPT. Likewise, 63 patients were tested for SPT against epithelia & danders. Dog epithelia was the deadliest allergen in its group of four inflicting 31.75% people. Similarly, 54 number of patients were tested for SPT against feather and fabrics. Fabric of silk dust raw was the most commonest fabric in its group inflicting 48.15% patients of allergic rhinitis. Dusts have always been reported to be notorious for those who were diagnosed positive for any chronic illness. SPT were done over 360 patients against nine different types of dusts. Grain dust rice and spider web dust stood first and second among dusts which were found positive among nearly 31% people and 29% people (Table 5).

Table 5: Distribution of SPT positive reports for various other allergens

Allergen types	No (%)	Allergens types	No (%)
Insects (n=325)		Feather and fabric (n= 54)	
Ant red	1.54	Chicken feather	14.81
Ant black	3.08	Pigeons feather	18.52
Cockroach	7.08	Sheep wool	18.52
Cricket	1.54	Silk dust raw	48.15
Grasshopper	5.54	Dusts (n=360)	
Honeybee	4.92	Cotton dust	5.28
Housefly	5.54	Hay dust	3.61
Jassid	1.23	House dust	11.67
Mosquito	8	Wheat dust	2.5
Moth	14.15	Paper dust	2.5
Rice weevil	33.85	Grain dust wheat	7.5
Wasp	13.54	Grain dust rice	31.11
Mites (n=346)		Polished dust	6.67
Bolimia SP	8.96	Spider web dust	29.17
D farine	21.68		
D pteronyssinus	69.36		
Epithelia dander (n=63)			
Buffalo dander	22.22		
Cat dander	26.98		
Dog epithelia	31.75		
Human dander	19.05		

DISCUSSION

The current study assessed the distribution of common allergic conditions among patients attending a health center in Pokhara and also identified the type of allergens which induced IgE mediated disorder. Allergic rhinitis (23.76%) was the second most common allergic disease seen after chronic urticaria (24.9%). This finding is almost similar to the findings of a study done in US which found 20% people suffering from allergic rhinitis resulting into loss of 3.8 million days from work and school.[12] However, a study from Mexico had different result showing 34% patients were of allergic rhinitis and 44% were having both rhinitis and asthma,[13] whereas we identified only 2.2% patient having both comorbidities. These finding underpins our hypothesis which means that prevalence of diseases vary from place to place, hence research should be done on the local basis.

Literature reviewed showed that house mite dust was the most common allergen against chronic allergic rhinitis when examined by SPT.[10,14] While our study finds that the most common allergen amongst allergic rhinitis patients were the food products (non-juicy food more specifically) followed by pollen and then by fabric and feather. This may be because agriculture is the main source of income of Nepal and Nepali and hence people are more frequently exposed to pollens compared to other allergens. However, when any particular allergen is considered, then Dermatophagoides pteronyssinus (mite) yielded highest number of positive diagnosis (69.36%). Therefore, it is advisable for people in Pokhara to avoid this mite if someone have symptoms of allergic rhinitis.

Looking at individual groups of allergens, we tested for 32 individual pollens locally available in Pokhara. Like ours, in many other places of India, researchers have found Prosopis juliflora to be important. For example, Shivpuri et al.[15] found it to be the major aeroallergen in Delhi while Singh and Kumar found it too important in North India.[16] However, other three pollens named Zea mays, Azadirachta indica, Mangifera indica, were also recognized to be tested positive in many patients which were not seen in other study panel of allergen. We included them in our study because they are widely available in Nepal and because every region has its own protocol and recommendation of battery of allergens for SPT. For illustration, a set of allergens is recommended for Europeans.[11]

Although the case of allergic rhinitis is very common in Nepal and worldwide, there are not many studies explaining role of food allergies in the allergic rhinitis. Unlike other studies, we found tobacco to be one of the most allergic foods while pea, barley and wheat are the least allergic according to SPT.

This study has limitations. First, it has not considered environment, changing seasons, age and other coexisting clinical situations which may influence allergic condition. Second, it has analysed descriptive statistics only. Therefore, we cannot specifically declare foods to be avoided. Further research is needed to prove causation. Nevertheless, our study overall suggest idea about food allergy which has potential to develop allergic rhinitis.

CONCLUSIONS

Based upon the findings of our study, allergic rhinitis is one of the most common allergic diseases in Gandaki province, Nepal. Patients of allergic rhinitis should be tested for certain allergens which are locally present and they need to modify lifestyle and avoid allergens which can induce IgE-mediated disorder. Further research is needed to establish causation.

CONFLICT OF INTEREST: None declared

SOURCE OF FUNDING: None

REFERENCES

1. de Weck AL. Atopic and nonatopic IgE-mediated allergy: a new interpretation of old facts? Int Arch Allergy Immunol. 2002;129(2):97-107. DOI:10.1159/000065874 PMID:12403926.
2. Groot Kormelink T, Thio M, Blokhuis BR, Nijkamp FP, Redegeld FA. Atopic and non-atopic allergic disorders: current insights into the possible involvement of free immunoglobulin light chains. Clin Exp Allergy. 2009;39(1):33-42. DOI: 10.1111/j.1365-2222.2008.03135.x PMID: 19040467.
3. Huber B. [100 years of allergy: Clemens von Pirquet - his idea of allergy and its immanent concept of disease]. Wiener Klinische Wochenschrift. 2006;118(19-20):573-9. DOI: 10.1007/s00508-006-0701-3 PMID: 17136331.
4. Kay AB. Allergy and allergic diseases. First of two parts. N Engl J Med. 2001;344(1):30-7. DOI: 10.1056/NEJM200101043440106 PMID: 11136958.
5. Bousquet PJ, Chatzi L, Jarvis D, Burney P. Assessing skin prick tests reliability in ECRHS-I. Allergy. 2008;63(3):341-6. DOI: 10.1111/j.1398-9995.2007.01581.x PMID: 18070229.
6. Asha'ari ZA, Yusof S, Ismail R, Che Hussin CM. Clinical features of allergic rhinitis and skin prick test analysis based on the ARIA classification: a preliminary study

in Malaysia. Annals of the Academy of Medicine 2010;39(8):619-24.

7. Haahtela T, Burbach GJ, Bachert C, Bindslev-Jensen C, Bonini S, Bousquet J, et al. Clinical relevance is associated with allergen-specific wheal size in skin prick testing. Clin Exp Allergy. 2014;44(3):407-16. DOI: 10.1111/cea.12240 PMID: 24283409.

8. Singh AB, Shahi S. Aeroallergens in clinical practice of allergy in India- ARIA Asia Pacific Workshop report. Asian Pacific Journal of allergy and immunology. 2008;26(4):245-56.

9. Nepali R, Sigdel B, Baniya P. Symptomatology and allergen types in patients presenting with allergic rhinitis. Brazilian journal of otorhinolaryngology. 2012;18:30-5. DOI: 10.3329/bjo.v18i1.10411

10. Acharya A, Nepali R, Sigdel B, Bania P. Identification of Allergens by Skin Prick test in patients of Pokhara suffering from allergic rhinitis. Nepalese Journal of ENT Head and Neck surgery. 2011;2(1):12-13. DOI:10.3126/njenthns.v2i1.6777

11. Bousquet J, Heinzerling L, Bachert C, Papadopoulos NG, Bousquet PJ, Burney PG, et al. Practical guide to skin prick tests in allergy to aeroallergens. Allergy. 2012;67(1):18-24.DOI: 10.1111/j.1398-9995.2011.02728.x PMID: 22050279.

12. Togias A. Unique mechanistic features of allergic rhinitis. J Allergy Clin Immunol. 2000;105(6Pt2): S599-604. DOI: 10.1067/mai.2000.106885 PMID: 10856164.

13. Larenas-Linnemann DE, Fogelbach GA, Alatorre AM, Cruz AA, Colín DD, Pech JA, et al. Patterns of skin prick test positivity in allergic patients: usefulness of a nationwide SPT chart review. Allergologia et immunopathologia. 2011;39(6):330-6. DOI: 10.1016/j.aller.2010.09.006 PMID: 21216084.

14. Ibekwe PU, Ibekwe TS. Skin Prick Test Analysis in Allergic Rhinitis Patients: A Preliminary Study in Abuja, Nigeria. J Allergy. 2016;2016:3219104. DOI: 10.1155/2016/3219104 PMID: 27247577.

15. Shivpuri DN, Parkash D. A study in allergy to prosopis juliflora tree (Hindi name: Kabuli Kelkar). Annals of allergy. 1967;25(11):643-8.

16. Singh A, Kumar P. Aeroallergens in clinical practice of allergy in India. An overview. Annals of agricultural and environmental medicine: AAEM. 2003;10:131-6.