**Abstract**

**Introduction:** Studies have implicated house dust mites and foods sensitivity in chronic urticaria based on skin prick testing and in vitro analysis. Hence we wanted to study the implication of pollen sensitivity in chronic urticaria patients along with foods and dust mite allergens using Skin Prick Test method.

**Methods:** This study was conducted in Allergy clinic, Preventive medicine unit, Kempegowda Institute of Medical Sciences Hospital, Bangalore from January 2005 to March 2010. Totally 300 patients with confirmed clinical diagnosis of Chronic urticaria were recruited and were subjected for Skin prick test with 123 allergen extracts and the results were analysed and interpreted.

**Results:** Out of 300 chronic urticaria patients, 171(57%) were in the age group of 20–39 years. 146(48.67%) were males and 154(51.33%) were females. 181(60.33%) were having only chronic urticaria. 140(46.67%) of urticaria patients were having symptoms from 6 weeks to one year. 44(14.67%) had a family history of atopy. Majority of urticaria patients (with or without co-morbid conditions), 164(54.66%) were sensitive to food allergens followed by pollens 92(30.66%), dust mites 60(20%) and others. Among food allergens, majority 15(5%) were sensitive to masoor dal followed by almonds 14(4.66%), ginger 13(4.33%) and yeast 13(4.33%). Among pollens, majority 32(10.66%) were sensitive to Prosopis juliflora followed by Parthenium hysterophorus 17(5.66%), Peltophorum pterocarpum 17(5.66%) and Chenopodium album 16(5.33%). Among dust mites, 42(14%) and 39(13%) were sensitive to D.farinae & D.pteronyssinus respectively.

**Conclusion:** Pollens sensitivity is also implicated in Chronic urticaria patients along with foods and dust mite allergens.

**Keywords:** Pollens sensitivity is also implicated in Chronic urticaria patients along with foods and dust mite allergens.

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**Introduction**

Chronic urticaria is one of the perplexing problems faced by the clinicians. Chronic urticaria is defined as daily or almost daily occurrence of urticarial wheals for at least six weeks.[1] Numerous physical agents can trigger the onset of urticaria, such as cold, heat, the sun, vibrations, rubbing (dermographism) or pressure. Urticaria can also be caused by drugs, food, infection (viral, bacterial, parasitic or fungal), insect stings, more rarely due to pneumoallergens.[2,3] Rhinitis and Asthma are other atopic diseases also affected by the above allergens.[4] Urticaria is a common disorder that affects as many as 20% of all people at sometime during their lives. The pathogenesis is complex and not well known. Studies[6-9] implicated house dust mites and foods sensitivity in chronic urticaria based on skin prick testing and in vitro analysis. Hence, we wanted to study the implication/role of pollen sensitivity in patients with chronic urticaria along with foods and dust mite allergens using Skin Prick Test method which is the gold standard to diagnose the clinical sensitivity.

**Materials and Methods**

After obtaining the Institutional Ethical Committee approval, the present study was conducted in the Allergy clinic, Preventive medicine unit, Kempegowda Institute of Medical Sciences Hospital & Research Centre, Bangalore from January 2005 to March 2010. Totally 300 patients with confirmed clinical diagnosis of Chronic urticaria (with a duration of more than 6 weeks), with co-morbid conditions like Allergic rhinitis (ARIA guidelines)[10], Bronchial asthma (GINA guidelines)[11] and Allergic conjuncti-
vitis who attended the Allergy clinic were recruited for the study after obtaining the informed consent. In all cases, questions regarding food allergies, drug intake, signs of infection, causes of physical urticaria, insect bites and personal and family history of atopy were asked. The clinical characteristics of the disease, such as duration, frequency and associated angioedema and symptoms of anaphylaxis were also investigated. Routine investigations such as complete blood count and urine examination were done to rule out the focus of infection. The complete history was obtained and physical examination was done to rule out the systemic diseases. The patients who were subjected to skin prick testing were instructed to stop drugs like antihistamines, bronchodilators, beta-blockers and theophylline. Skin prick tests were performed on 300 patients with 123 allergen extracts. The extracts included 19 pollens, 5 dusts, 2 dust mites, 10 fungi, 10 insects, 3 epithelia and 74 food allergens. Allergen extracts for skin prick tests were obtained from Creative Drug Industries, Navi Mumbai.

Procedure of skin prick testing (SPT)

SPT was performed on the flexor side of upper arm and forearm after cleaning with isopropyl alcohol. A single drop of each allergen extract of 1:10 concentration was placed along with positive control (Histamine) and negative control (saline).

Sterile lancet was used to prick by making a shallow lift (at an acute angle) for a second to allow adequate entry of antigen beneath the stratum corneum epidermis. This was repeated for each allergen after wiping the lancet with dry cotton. The allergen was left in place for 20 minutes then the reading of wheel area (allergen), saline area and histamine area diameter was taken with the help of measuring scale.[12,13] Interpretation of test results was done according to Agarwal criteria.[14] Allergens, which produced wheal areas more than 2+ (grade 2 and above) were considered as positives.

Results

Out of 300 chronic urticaria patients, the maximum i.e. 171 (57%) were in the age group of 20–39 years. Among them, 146 (48.67%) were males and 154 (51.33%) were females. Among males, maximum i.e. 49 (33.56%) were in the age group of 20 – 29 years, whereas in females, maximum i.e. 43 (27.92%) were in the age group of 30 – 39 years. The mean age of chronic urticaria patients was 35.15 ± 12.96 years and the range was 8 – 72 years. (Table 1)

Majority i.e., 181 (60.33%) were having chronic urticaria alone. The other co-morbid conditions associated with chronic urticaria were chronic urticaria with conjunctivitis among 43 (14.33%) patients followed by chronic urticaria with allergic rhinitis among 34 (11.33%) and chronic urticaria with conjunctivitis & rhinitis among 21 (7%). (Table 2)

The average duration of chronic urticaria was 3.3±4.2 years. Majority i.e. 140 (46.67%) patients were having symptoms from 6 weeks to one year, next highest, 49 (16.33%) were having symptoms from 5 to 10 years and the least 13 (4.33%) were having symptoms for more than 10 years. (Table 3)

Table 1. Age and sex wise distribution of Chronic urticaria patients

| Age in years | Male | Female | Total |
|--------------|------|--------|-------|
|              | No.  | Percentage | No.  | Percentage | No.  | Percentage |
| < 10         | 2    | 1.37    | 1    | 0.64       | 3    | 1          |
| 10 – 19      | 11   | 7.54    | 11   | 7.14       | 22   | 7.33       |
| 20 – 29      | 49   | 33.56   | 37   | 24.04      | 86   | 28.67      |
| 30 – 39      | 42   | 28.77   | 43   | 27.92      | 85   | 28.33      |
| 40 – 49      | 21   | 14.38   | 36   | 23.38      | 57   | 19         |
| >50          | 21   | 14.38   | 26   | 16.88      | 47   | 15.67      |
| Total        | 146  | 100     | 154  | 100        | 300  | 100        |

Table 2. Distribution of Chronic urticaria patients according to co morbid conditions

| Co morbid conditions | No. | Percentage |
|----------------------|-----|------------|
| Ch. Urticarial        | 181 | 60.33      |
| Ch. urticaria & allergic rhinitis | 34 | 11.33 |
| Ch. urticaria & asthma | 7 | 2.33 |
| Ch. urticaria & conjunctivitis | 43 | 14.33 |
| Ch. urticaria, conjunctivitis & rhinitis | 21 | 7 |
| Ch. urticaria, conjunctivitis & asthma | 4 | 1.33 |
| Ch. urticaria & bronchitis | 1 | 0.33 |
| Ch. urticaria & pharyngitis | 1 | 0.33 |
| Ch. urticaria, rhinitis & asthma | 3 | 1 |
| Ch. urticaria, conjunctivitis, rhinitis & asthma | 1 | 0.33 |
| Ch. urticaria & angioedema | 2 | 0.66 |
| Ch. urticaria, rhinitis & angioedema | 1 | 0.33 |
| Ch. urticaria, conjunctivitis, rhinitis, asthma & angioedema | 1 | 0.33 |
symptoms from 13 to 18 months.

Forty four (14.67%) chronic urticaria patients had a family history of atopy. Among them, 19 (43.18%) had family history of atopy in mother, followed by 17 (38.64%) in siblings, 8 (18.18%) in father, 3 (6.81%) in paternal side and 2 (4.54%) in maternal side.

Majority of chronic urticaria patients (with or without co-morbid conditions) i.e., 164 (54.66%) were sensitive to food allergens, followed by pollens 92 (30.66%), dust mites 60 (20%) and others. In this study, those patients with h/o angioedema (4) were not positive for any of the allergen. (Table 3A)

The sensitivity for pollen allergens is found to be more than dust mite allergens in chronic urticarial patients (with or without co-morbid conditions) and the difference is found to be statistically significant. (Table 3B)

Among food allergens, majority of patients i.e., 15(5%) were sensitive to masoor dal, followed by almonds 14(4.66%), ginger 13(4.33%), yeast 13(4.33%) and others. (Table 4A) Among pollens, majority i.e., 32(10.66%) were sensitive to Prosopis juliflora, followed by Parthenium hysterophorus 17(5.66%), Peltophorum pterocarpum 17(5.66%), Chenopodium album 16(5.33%) and others. (Table 4B)

Among dust mites, 42 (14%) and 39 (13%) were sensitive to Dermatophagoides farinae & Dermatophagoides pteronyssinus respectively.

Among dusts, majority of patients, 17(5.66%) were sensitive to House dust, followed by Paper dust 12(4%), wheat dust 10(3.33%), cotton dust 6(2%) and hay dust 3(1%).

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**Table 3A. Distribution of Chronic urticaria patients according to skin test positivity**

| Type of allergy          | Food | Pollens | Dust mite | Dust |
|--------------------------|------|---------|-----------|------|
|                          | No   | %       | No   | %   | No  | %   | No   | %  |
| Urticaria [n = 181]      | 103  | 56.9    | 54   | 29.83 | 31   | 17.13 | 23   | 12.71 |
| Urticaria & allergic rhinitis [n = 34] | 15  | 44.12   | 8    | 23.53 | 4    | 11.76 | 2    | 5.88 |
| Urticaria & asthma [n = 7] | 4   | 57.14   | 3    | 42.87 | 4    | 57.14 | 1    | 14.26 |
| Urticaria & conjunctivitis [n = 43] | 18  | 41.86   | 14   | 32.56 | 9    | 20.93 | 5    | 11.63 |
| Urticaria, conjunctivitis & rhinitis [n = 21] | 15  | 71.43   | 7    | 33.33 | 7    | 33.33 | 5    | 23.81 |
| Urticaria, conjunctivitis & asthma [n = 4] | 4   | 100     | 2    | 50    | 1    | 25    | 1    | 25    |
| Urticaria & bronchitis [n = 1] | 1   | 100     | 1    | 100   | 1    | 100   | -    | -     |
| Urticaria & pharyngitis [n = 1] | -  | -       | -    | -     | -    | -     | -    | -     |
| Urticaria, rhinitis & asthma [n = 3] | 3   | 100     | 2    | 66.67 | 2    | 66.67 | 1    | 33.33 |
| Urticaria, conjunctivitis, rhinitis & asthma [n = 1] | 1 | 100 | 1 | 100 | - | - | - | - |
| Urticaria & angioedema [n = 2] | -  | -       | -    | -     | -    | -     | -    | -     |
| Urticaria, rhinitis & angioedema [n = 1] | -  | -       | -    | -     | -    | -     | -    | -     |
| Urticaria, conjunctivitis, rhinitis, asthma & angioedema [n = 1] | -  | -       | -    | -     | -    | -     | -    | -     |
| Total [n = 300]           | 164  | 54.66   | 92   | 30.66 | 60   | 20    | 38   | 12.66 |

**Table 3B. Difference in skin test positivity between pollen and dust mite allergens**

| Type of allergy          | Pollens | Dust mites | Z-value | P-value |
|--------------------------|---------|-----------|---------|---------|
|                          | No      | %         | No      | %       |
| Urticaria [n = 181]      | 54      | 29.83     | 31      | 17.13   | 2.476  | 0.013 |
| Urticarial with co morbidities [n=119] | 38  | 31.93   | 29      | 24.37   | 1.256  | 0.209 |
| Total [n=300]            | 92      | 30.66     | 60      | 20      | 2.75   | 0.006 |
Among fungi, majority of patients i.e., 11 (3.66%) were sensitive to Candida albicans, followed by Aspergillus fumigatus 10 (3.33%), Cladosporium herbarum 7 (2.33%), Penicillium Sp 6 (2%) and others (i.e., Alternaria alternate 5 (1.66%), Aspergillus flavus 4 (1.33%), Trichoderma 4 (1.33%), Curvularia lunata 2 (0.66%), Helminthosporum 1 (0.33%) and Aspergillus niger 1 (0.33%).

| Allergen | Patients positive | Allergen | Patients positive |
|----------|------------------|----------|------------------|
| Foods    | No %             | Foods    | No %             |
| Masoor dal | 15 5             | Vinegar  | 11 3.66          |
| Almonds  | 14 4.66          | Milk     | 10 3.33          |
| Ginger   | 13 4.33          | Mustard  | 10 3.33          |
| Yeast    | 13 4.33          | Chikoo   | 10 3.33          |
| Mushroom | 12 4             | Soyabean | 10 3.33          |
| Peanut   | 12 4             | Urad dal | 10 3.33          |
| Cauliflower | 12 4            | Gram (Kabool) | 10 3.33 |
| Cashewnut | 11 3.66         | Wheat    | 10 3.33          |
| Coconut  | 11 3.66          | Egg (yolk) | 10 3.33         |
| Card     | 11 3.66          | Tea      | 9 3              |

Table 4 B. Distribution of Chronic urticaria patients according to skin prick test positivity to pollen allergens (n = 300)

| Allergen                     | Patients positive | Allergen                     | Patients positive |
|------------------------------|-------------------|------------------------------|-------------------|
| Pollen                       | No %              | Pollen                       | No %              |
| Prosopis juliflora           | 32 10.66          | Xanthium strumarium          | 9 3               |
| Parthenium hysterophorus     | 17 5.66           | Ailanthus excelsa            | 8 2.66            |
| Peltophorum pterocarpum      | 17 5.66           | Dodonea viscoso              | 7 2.33            |
| Chenopodium album            | 16 5.33           | Cynodon dactylon             | 6 2               |
| Ageratum conyzoides          | 13 4.33           | Holopteflea intergrifolia    | 6 2               |
| Cassia siamea                | 13 4.33           | Azadirchta indica            | 5 1.66            |
| Accacia arabica              | 12 4              | Cocos nucifera               | 4 1.33            |
| Ricinus communis             | 12 4              | Sorghum vulgare              | 4 1.33            |
| Amaranthus spinosus          | 11 3.66           | Typha angustata              | 2 0.66            |
| Casuarina equisetifolia      | 10 3.33           |                              |                   |

Discussion

In the present study, the mean age of chronic urticaria patients was 35.15 ± 12.96 years. This is in accordance with the findings of Priya HA et al[7] where the mean age was 35.7 years.

In the present study, maximum i.e., 60.33% were having chronic urticaria alone. The other co-morbid conditions associated with chronic urticaria were chronic urticaria with conjunctivitis among 14.33% of patients followed by chronic urticaria with allergic rhinitis among 11.33% and chronic urticaria with conjunctivitis & rhinitis among 7%. This observation is in accordance with the findings of Hari Priya et al[7], where 54.9% of patients were hav-
ing chronic urticaria alone, 22.4% had chronic urticaria and aller-
genic rhinitis and 23% had chronic urticaria with asthma.

Majority of chronic urticaria patients were having symptoms from 6 weeks to one year in the present study, whereas majority of patients were having symptoms of chronic urticaria from 1 to 4 years in the study conducted by Priya HA et al[7].

In the present study, 14.67% of chronic urticaria patients had a family history of atopy, which was lower than the findings of Anuradha et al[15] where 31.8% of chronic urticaria patients had family history of atopy.

In Chronic urticaria patients, Rhinitis and Asthma were other at-
opic diseases also affected by food allergens.[4] Similar findings was observed in the present study.

In the present study, majority 164 (54.66%) of the chronic urticaria patients (with or without co morbid conditions) were sensitive to food allergens. The most common foods for which they were sensitive were Masoor dal, Almond, Ginger and Yeast. Whereas in the study conducted by Priya HA et al[7], majority were sensitive to beans, mustard, cardamom, cashew and ginger. In the study conducted by Por Alvarado MI[16], the principal foods involved in allergic reactions were fruits (57.7%), tree nuts (23.9%) and crustaceans (12.7%) in adults and fruits (54.2%), tree nuts (20%), legumes (14.3%) and fish (14.3%) in children.

Majority of the patients were sensitive to Prosopis juliflora (10.66%), followed by Parthenium hysterophorus (5.66%), Peltophorum pterocarpum (5.66%) and Chenopodium album (5.33%). It differs from the study conducted by Anuradha et al[15], where the predominant pollen allergens in urticaria were Sorghum vul-
gare (64.7%) followed by Pennisetum typhoides (56.7%) and Artemesia scoparia (51.9%). Though the studies[6-9] implicated house dust mites and foods sensitivity in chronic urticaria based on skin prick testing and in vitro analysis, in the present study, in addition to house dust mite and food sensitivity, majority of patients have also shown sensitivity to pollens.

In the present study, 14% & 13% of patients were sensitive to Dermatophagoides fariniae & Dermatophagoides pteronyssinus respectively. This is in accordance with the other studies[6,8,9,17]. Studies[8,9] have also shown a significant association between house dust mite sensitivity and chronic urticaria using intradermal and in vitro testing.

The study conducted by Tanaka et al[18] suggested the route of entry of the house dust mite allergens into the skin tissues to interact with specific IgE on mast cells. Numata[9] has also discussed the hypothesis of Hannafin that the dust mite antigen could penetrate the stratum corneum based upon its molecular weight.

To conclude, this study suggests a possible association/role of pollens sensitivity with chronic urticaria in addition to foods & dust mites sensitivity. It is important to perform skin prick tests among patients suffering from chronic urticaria (with or without comorbidities) not only for food allergens but also for pollens, house dust mites and other allergens for diagnosis and proper management. Since there seem to be geographical differences in the prevalence of allergens causing allergy, there is a need to carry out more such studies in different regions.

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