The Effect of Food Avoidance in Adult Patients with Chronic Idiopathic Urticaria

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Background: *Recent findings show food allergy is rarely the cause of chronic urticaria. However, reports showed up to 5% of chronic idiopathic urticaria (CIU) was food induced urticaria (FIU) and the remission rate with food avoidance in CIU was varied. According to recent studies, skin prick test (SPT) is not a gold standard for investigating the culprit food allergen in CIU. The clinical response for food avoidance is still unclear.*
Objective: *The purpose of the present study is to investigate the association of food allergen and SPT, the clinical response after positive food avoidance in adult Thai patients with CIU.*
Material and Method: *We conducted a prospective study that included 76 patients, who presented with CIU at the Division of Dermatology, Department of Medicine, Phramongkutklao Hospital, between September 1, 2009 and May 31, 2010. Personal data, general physical examination, and detailed history were obtained. Twenty food allergens were used to perform SPT at the allergy clinic. The positive food allergens were enrolled to avoid the culprit food allergens for two to four weeks and evaluated the clinical response.*
Results: *Fifty-one of 76 patients (67.1%) gave history compatible with FIU. Shrimp (54.9%) and fish (49.0%) were the two most commonly suspected allergens by the patients. Fifteen of 76 patients (19.7%) had positive SPT. In comparison to the SPT negative group in terms of clinical severity and effect on their daily lives, there was no significant difference. We then matched the SPT results with the patient's history. Five of 76 (6.6%) patients had results of SPT matching the patients' history. The five allergens in these patients were fish, milk, tomato, shrimp, and yeast. Fifty-one of 76 (67.1%) patients had negative SPT results but the patients suspected that certain foods were the cause of their urticaria. Fifteen of 76 (19.7%) patients had positive SPT results but the patients had never suspected any food allergen. Among these SPT positive patients, 13 food allergens were the culprits, the first three most common SPT allergens in this group were peanut, oyster, and tomato. Upon SPT positive food avoidance, 12 of 15 (80%) SPT+ patients had significant improvement of symptom score in term of clinical severity and effect on their daily lives.*
Conclusion: *Although SPT still yielded a low sensitivity for the diagnosis of FIU, the present study showed a very good response by food avoidance in patients who were SPT positive.*

Keywords: *Chronic idiopathic urticarial (CIU), Food induced urticarial (FIU), Skin prick test (SPT), Food avoidance*

J Med Assoc Thai 2015; 98 (12): 1162-8
Full text. e-Journal: *http://www.jmatonline.com*

Urticaria is defined as a skin lesion consisting of a wheal and flare reaction, in which, localized edema (wheal) is surrounded by an area of erythema (flare) that is typically pruritic. Individual lesion can last for about 30 minutes and usually subsides within 24 hours and regress without any mark. Urticaria is divided into acute and chronic forms depending on the duration of the disease. The cut point of chronic urticarial is at 6-week[1].

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Chronic urticaria is defined as recurrent urticaria that occurs at least twice a week for more than six consecutive weeks[2]. Chronic urticaria is further classified into two major subgroups, chronic autoimmune urticarial, and chronic idiopathic urticaria[1]. The idiopathic cause occurs approximately for 75% of the cases[3].

Chronic idiopathic urticaria (CIU) is related to various factors such as foods, drugs, aeroallergens. Food induced urticaria (FIU) is defined as urticaria that is aggravated by food allergen and is associated with IgE hypersensitivity[4]. The incidence of FIU is still low. Wananukul et al reported 7% in Thai children who were tested positive to the food challenges mostly from egg, cow's milk and wheat[5]. In contrast,

Greaves et al found that 5% of the CIU patients showed pseudo-allergic reaction to food preservatives and dyes[6]. Recent reports on FIU discussed the role of pseudo-allergen, dye, and preservative[7-9].

Most FIU tests use clinical urticarial as an end point. The gold standard for the diagnosis of food allergy is the double-blinded, placebo-controlled oral food challenges test (DBPCFC)[10] but the test is complicated and needs closed observation during the procedure. Furthermore, there is a risk of serious IgE hypersensitivity response, i.e., anaphylaxis. The most commonly used method is skin prick test (SPT), which represented the IgE mediated hypersensitivity and widely used in practice. Radioallergosorbent test (RAST) is another test for the specific IgE antibody in the patient's serum and is suggested to have a similar accuracy to SPT[11]. The RAST is an in-vitro test so there is no risk of anaphylaxis reaction. Although the accuracy, sensitivity and specificity of SPT is varied[11,12], SPT is beneficial as a convenient screening test and assists in the diagnosis of FIU.

There are many studies regarding the food avoidance in CIU patient. The remission rate is varied from 17 to 89%[13-15]. Malanin et al[13] reported 89% of SPT positive patients experienced marked relief of symptoms after avoiding food additives. Moreover, many studies achieved good results for the avoidance of pseudo-allergen in food[14,15].

The aim of the present study is to investigate the association of food allergen and SPT, the clinical respond after positive food avoidance in adult Thai patients with CIU.

Material and Method

This prospective study enrolled patients who presented with chronic urticaria at the Division of Dermatology, Department of Medicine, Phramongkutklao Hospital, between September 1, 2009 and May 31, 2010. The present study was approved by the Clinical Research Ethical Committee of Phramongkutklao Hospital and Medical College.

Inclusion criteria

Patients aged 18 to 60 years who had recurrent urticaria at least twice a week for more than six consecutive weeks.

Exclusion criteria

1. Chronic urticaria with identifiable cause
2. Physical urticaria e.g., cold urticaria, aquagenic urticatia, etc.
3. Patients with abnormal laboratory investigation i.e., complete blood count, urine analysis, liver function test, hepatitis virus profile, thyroid function test, anti-thyroid peroxidase (TPO) antibody, antithyroglobulin, antinuclear antibody, or stool examination
4. Patients with abnormal dental evaluate
5. Patients with history of anaphylaxis
6. Patients with autoimmune diseases or abnormal immune response such as patients with HIV or receiving immunosuppressive agent

Informed consents were obtained from all the enrolled patients. Then, the patients underwent the following steps:

1. The patients were asked to complete a questionnaire that contained their demographic data, personal and family history of allergy, current urticaria symptom, severity, history of food induced urticaria, subjective evaluation of urticarial symptom, and effect on their daily lives.
2. Complete physical examination and relevant laboratory investigation were done. The laboratory including complete blood count, urine analysis, liver function test, hepatitis virus profile, thyroid function test, anti-TPO antibody, anti-thyroglobulin, antinuclear antibody, and stool examination.
3. All patients were asked to avoid long acting antihistamines for seven days, short acting antihistamines for three days, and any systemic or topical steroids.
4. SPT was done at the allergy clinic, Department of Medicine, Phramongkutklao Hospital by the same trained nurse in the setting where resuscitation equipment was available. Twenty food allergens had been reported to be the cause of food induced urticaria in adult[16,17] and considered to be common foods eaten in Thai population i.e., wheat grain, rice, sweet corn, beef, chicken, pork, shrimp, crab, mixed fish, oyster, tomato, peanut, soy bean, cocoa bean, onion, mushroom, cow's milk, yeast (*Saccharomyces cerevisiae*), egg white, and egg yolk (ALK Abello, Port Washington, New York, USA). Histamine solution and 0.9% NaCl (normal saline) solution were used as positive and negative control respectively. The results were interpreted by the same physician at 15 minutes with the positive wheal was at least 3 mm in diameter[18].

For the patient with positive SPT for food, we asked them to avoid the culprit food. They could continue their medication as needed, but not to exceed

their previous usage. The follow-up was done by phone interview after two weeks of culprit food avoidance for scoring of clinical severity and effect on their daily lives. For the patients who reported no clinical improvement after food avoidance, we asked them to continue the food avoidance for another two weeks and re-evaluation was repeated.

Statistical analysis

Descriptive statistics such as mean, median, minimum, maximum and percentages were used to describe demographic data and SPT. Unpaired t-test was used to compare two population means by STATA version 11 (Stata Corp, College Station, Texas, USA).

Results

Seventy-six patients were included in the study. The mean age of the patients was 37.7±12.3 years. There were 16 (21.1%) male and 60 (78.9%) female. The mean duration of symptom prior to enroll at this hospital was 26.0 months. Fifty-one patients (67.1%) gave history compatible with FIU. The others gave history related to aeroallergens, humidity, insects, animals, chemicals, and drugs. Among the patients who had history compatible with FIU, shrimp and fish were the two most commonly suspected allergens, i.e., 28 (54.9%) and 25 (49.0%) respectively. The others were yeast (15), crab (13), oyster (12), chicken (4), pork (3), milk (2), egg yolk (2), and one patient each for soybean, peanut, tomato, wheat, and

Table 1. Demographic data, symptom, severity, and relevant history of the patients

	Total (n = 76)	SPT negative (n = 61)	SPT positive (n = 15)	*p*-value
Age (year), mean ± SD	37.7±12.3	38.4±12.6	34.5±11.1	0.274
Duration (month), median (min-max)	12 (2-120)	12 (2-120)	8 (2-84)	0.359
Sex: females, n (%)	60 (78.9)	49 (80.3)	11 (73.3)	0.389
Suspected cause of urticarial, n (%)	51 (67.1)	39 (63.9)	12 (80.0)	
Food	33 (43.4)	26 (42.6)	7 (46.7)	0.191
Aeroallergen	14 (18.5)	13 (21.4)	1 (6.7)	0.777
Drug, chemical	16 (21.0)	14 (23.0)	2 (13.4)	0.176
Other				0.335
Number of urticarial, n (%)				
1-6 lesions	21 (27.6)	17 (27.9)	4 (26.7)	0.926
7-12 lesions	11 (14.5)	10 (16.4)	1 (6.7)	0.337
>12 lesions	44 (57.9)	34 (55.7)	10 (66.7)	0.442
After taking suspected food, mean ± SD				
Onset (minute)	136.9±105.4	140.9±107.4	124.20±102.9	0.774
Duration (minute)	294.7±230.1	310.1±250.4	245.83±227.5	0.510
Size of the largest lesion, n (%)				
<1 cm	10 (13.2)	8 (13.1)	2 (13.3)	0.982
1-2 cm	10 (13.2)	8 (13.1)	2 (13.3)	0.982
>2 cm	56 (73.7)	45 (73.8)	11 (73.3)	0.973
Frequency of attack, n (%)				
2-3/week	12 (15.8)	11 (18.0)	1 (6.7)	0.240
4-5/week	3 (3.9)	2 (3.3)	1 (6.7)	0.546
6-7/week	42 (55.3)	33 (54.1)	9 (60.0)	0.480
More than 7/week	19 (25.0)	15 (24.6)	4 (26.7)	0.868
Associated symptom#, n (%)	69 (90.8)	59 (96.7)	10 (66.7)	<0.001**
Associated allergy history##, n (%)	33 (43.4)	26 (42.6)	7 (46.7)	0.777
Family history of urticaria*, n (%)	32 (42.1)	24 (39.3)	8 (53.3)	0.489
Family history of allergy*, n (%)	25 (32.9)	20 (32.8)	5 (33.3)	1.000

SPT = skin prick test

Fever, arthalgia, palpitation, headache, flushing

Allergic rhinitis, allergic conjunctivitis, atopic dermatitis, asthma, drug allergy

* 1st, 2nd, 3rd degree relation

egg white. The clinical symptom, related food, personal, and family history were summarized in Table 1.

Among the 51 patients who had history of FIU, 15 (19.7%) were SPT positive for food. Patients were classified into four groups according to the history of FIU and results of SPT, i.e., H+SPT+ (history of FIU matched the result of SPT), H+SPT- (history of FIU but SPT was negative), H-SPT+ (no history of FIU but SPT was positive), and H-SPT- (no history of FIU and SPT was negative).

Table 2 showed all the 20 food allergens used in SPT in relation to the patient groups. Five allergens were SPT positive in concordant with the patients' history (H+SPT+) i.e., fish (2), milk (1), tomato (1), shrimp (1), and yeast (1). For patients who suspected that food was the cause of their urticaria but SPT was negative (H+SPT-), the allergens were crustaceans, i.e., shrimp, oyster and crab (52), fish (23), yeast (14), chicken (4), pork (3), and one each for wheat grain, peanut, soybean, cow's milk, and egg white. There were 14 food allergens that had never been suspected by the patients but the SPT was positive (H-SPT+) i.e., peanut (8), oyster (3), tomato (3), cocoa (2), fish (2), crab (2), chicken (2), pork (2), wheat (2), soybean (2), and one each for rice, cow's milk, egg yolk, and egg white.

Upon comparing the 15 patients with positive SPT with the negative SPT group, the clinical symptom and effect on their daily lives were not significantly different as shown in Table 1. The food allergens that tested positive in these patients were peanut (8), tomato (4), fish (4), oyster (3), wheat (2), soybean (2), milk (2), pork (2), chicken (2), crab (2), cocoa (2), and one patient each for rice, shrimp, egg white, egg yolk, and yeast.

After food avoidance, 12 (80%) patients improved the symptom score in terms of clinical severity and effect on their lives. There was a significant decrease in symptom score from 24 to 12.5 after two weeks of the avoidance (p<0.001). Among the three patients who did not respond to the food avoidance after the first two weeks, one experienced reduced symptom after another two weeks of food avoidance, one patient did not have any improvement after the extended avoidance time, and one patient declined to extend the period of food avoidance. Fig. 1 showed the schematic representation of the effect of food avoidance in weeks versus the patients' symptom (represent to urticarial rash, itchiness, and effect on the patients daily lives).

Table 2. Skin prick test result in relation to patients' history

Allergens	H+SPT+ (%) n = 5	H+SPT- (%) n = 51	H-SPT+ (%) n = 15	H-SPT- (%) n = 76
Wheat grain	0 (0)	1 (1.3)	2 (2.6)	73 (96.1)
Sweet corn	0 (0)	0 (0)	0 (0)	76 (100)
Rice	0 (0)	0 (0)	1 (1.3)	75 (98.7)
Peanut	0 (0)	1 (1.3)	8 (10.5)	67 (88.2)
Soybean	0 (0)	1 (1.3)	2 (2.6)	73 (96.1)
Tomato	1 (1.3)	0 (0)	3 (3.9)	72 (94.7)
Onion	0 (0)	0 (0)	0 (0)	76 (100)
Mushroom	0 (0)	0 (0)	0 (0)	76 (100)
Cow's milk	1 (1.3)	1 (1.3)	1 (1.3)	73 (96.1)
Mixed fish	2 (2.6)	23 (30.3)	2 (2.6)	49 (64.5)
Pork	0 (0)	3 (3.9)	2 (2.6)	71 (93.4)
Chicken	0 (0)	4 (5.3)	2 (2.6)	70 (92.1)
Shrimp	1 (1.3)	27 (35.5)	0 (0)	48 (63.2)
Oyster	0 (0)	12 (15.8)	3 (3.9)	61 (80.3)
Crab	0 (0)	13 (17.1)	2 (2.6)	61 (80.3)
Cocoa bean	0 (0)	0 (0)	2 (2.6)	74 (97.4)
Egg yolk	0 (0)	2 (2.6)	1 (1.3)	73 (96.1)
Egg white	0 (0)	1 (1.3)	1 (1.3)	74 (97.4)
Beef	0 (0)	0 (0)	0 (0)	76 (100)
Yeast	1 (1.3)	14 (18.4)	0 (0)	61 (80.3)
Total test	6	103	32	1,379

H+SPT+ (history of FIU matched the result of SPT), H+SPT- (history of FIU but SPT was negative), H-SPT+ (no history of FIU but SPT was positive), and H-SPT- (no history of FIU and SPT was negative)

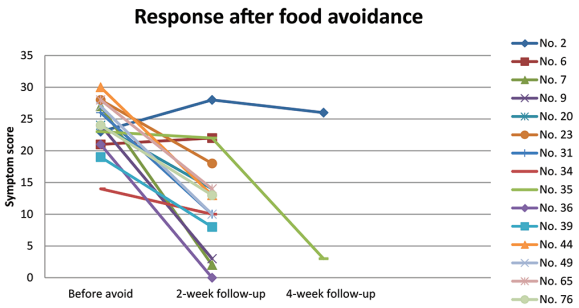

Fig. 1 Shows symptom score in relation to the period of food avoidance.

Discussion

Food induce urticaria was common in acute urticaria than chronic urticaria[2]. Suspected food allergens mostly cause urticaria were food preservatives

and food additive, e.g., food coloring and flavoring, which resulted in pseudo-allergic reaction[7-9]. About 5% of chronic idiopathic urticaria was caused by food[6].

Although SPT was not the standard method for the diagnosis FIU, it was still widely used. Kulthanan et al reported 30% of positive SPT for food but only 1.1% with clinical relevance to food allergen[16]. This was in accordance with the previous study by Malanin et al who reported 26% positive SPT for food additives in CIU[13]. In the present study, 15 of 76 CIU patients (19.7%) were SPT positive to the following food antigens, peanut (8), tomato (4), fish (4), oyster (3), cocoa (2), and one each for yeast, wheat, soybean, milk, pork, chicken, crab, rice, shrimp, egg white, and egg yolk.

To look at the clinical relevance between the patients' history of suspected food and the SPT result, we classified the patients into four groups. In group 1, five patients (6.6%) had history that matched the SPT result (H+SPT+) to five food allergens, i.e., fish, milk, tomato, shrimp, and yeast. One patient had two positive results that matched the history for fish and shrimp. In group 2, the patients suspected that food was the cause of their urticaria especially seafood (shrimp, oyster, crab, fish) and yeast (*S. cerevisiae*) but the SPT were negative (H+SPT-). These food antigens are commonly eaten by Thai people including yeast, which is used in prickled fruit, beer, and bakery products. Interestingly, shrimp was the number one food culprit suspected by the patient but most patients were tested negative (27/76, 35.5%). In group 3, the patients had positive SPT but never suspected food as the cause of their urticaria. The main culprit allergen in this group was peanut (8/76, 10.5%). The group 4, which contained the majority of the patients, had never suspected foods as the causes of their urticaria and the SPT was negative (H-SPT-).

The remission or alleviation of symptom after food avoidance in CIU was reported in various studies, mostly with regard to food additives. Malanin et al reported food additives avoidance in CIU with 89% improvement (16 of 18 SPT positive patients)[13]. Zuberbier et al put 64 CIU patients under pseudo-allergen-free diet. The result showed 73% experienced reduced symptoms within two weeks and 46% achieved complete remission in six months follow-up[14]. Moreover, Bunselmeyer et al used a new incremental build-up food (IBUF) protocol for pseudo-allergen-free diet in CIU and did the follow-up after three to 24 months with 51% achieving partial remission and 17% achieving complete remission[15]. Our study showed 12/15 patients with positive SPT (80%) achieved significant reduced symptoms score after two weeks of food avoidance, Fig. 1. One of the patients, No. 36, had complete remission after two weeks follow-up. Moreover, two patients, No. 7 and 9, were close to remission during the first follow-up. Three patients did not have benefit after two weeks of SPT positive food avoidance. One, No. 35, finally had reduced symptom after another two weeks of food avoidance. Patient No. 2 failed to avoid the culprit foods over the next two weeks of follow-up. The SPT positive allergens were peanut, soybean, fish, and yeast. These foods were hard to avoid since they could be present in condiments e.g., soybean sauce and fish sauce. We suggested to the patient to cook her own food using salt. The third patient, No. 6, declined to avoid the culprit food for another two weeks because the positive allergen was rice, which is the staple food for Thai people. Finally, we found 13 of 15 patients (86.7%) who had reduced symptoms and effect on their lives after four weeks of avoiding the SPT positive food allergens.

In conclusion, although SPT is not the gold standard for the diagnosis of FIU, our study showed the benefit of SPT in some patients. On one hand, SPT still has low sensitivity (5.8%). On the other hand, if the patients have SPT positive, food avoidance could be highly successful in the management of FIU. At least, the patient could reduce the need for medication.

What is already known on this topic?

Food allergy is rarely the cause of chronic urticaria, many reports showed up to 5% of chronic idiopathic urticaria is caused by food induced urticaria. The history relevance of individual positive reaction in FIU is very low (1.1%). Skin prick test (SPT) is not a gold standard to investigate the culprit food allergen in FIU, and the clinical response after food avoidance is still unclear.

What this study adds?

The relevance of previous history and positive prick test reaction in our study is still low (6.6%). We identified good clinical improvement after the avoidance of culprit food allergen in 87.6% of the patients who had positive prick test to food allergen, even those who had no relevant history. The authors note that the SPT is still working for the clinical management of FIU patients who had positive prick test reactions.

Potential conflicts of interest

None.

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ผลของการหลีกเลี่ยงอาหารในผู้ป่วยลมพิษเรื้อรังชนิดไม่ทราบสาเหตุ

สุพิชญา ไทยวัฒน์, อาทิตย์ นาคะเกศ, อธิก แสงอาสภวิริยะ

ภูมิหลัง: ในปัจจุบันพบว่า มีผู้ป่วยจำนวนน้อยมากที่อาหารมีส่วนกระตุ้นให้เกิดลมพิษชนิดเรื้อรัง อย่างไรก็ตามมีรายงานพบว่าร้อยละ 5 ของผู้ป่วยลมพิษชนิดเรื้อรังมีอาหารเป็นสาเหตุกระตุ้น และอัตราการหายของการหลีกเลี่ยงอาหารยังมีผลลัพธ์ที่แตกต่างกันอยู่มาก อ้างถึงการศึกษาเกี่ยวกับการทดสอบสารภูมิแพ้ด้วยการสะกิดไม่ใช่การวินิจฉัยหลักในผู้ป่วยลมพิษที่เกิดจากการแพ้อาหาร แต่ผลลัพธ์ทางอาการของการหลีกเลี่ยงอาหารที่แพ้ยังคงให้ผลที่ไม่ชัดเจน

วัตถุประสงค์: เพื่อหาความสัมพันธ์ระหว่าง สารก่อภูมิแพ้ในอาหาร การทดสอบสารภูมิแพ้โดยวิธีการสะกิดและอาการตอบสนองหลังจากหลีกเลี่ยงอาหารในผู้ป่วยลมพิษเรื้อรังชนิดไม่ทราบสาเหตุ ที่มีผลการทดสอบผิวหนังเป็นบวก

วัสดุและวิธีการ: ทำการศึกษาในผู้ป่วยลมพิษชนิดไม่ทราบสาเหตุจำนวน 76 ราย ที่มาตรวจในแผนกโรคผิวหนัง โรงพยาบาลพระมงกุฎเกล้า ในระหว่างวันที่ 1 กันยายน พ.ศ. 2552 ถึง 31 พฤษภาคม พ.ศ. 2553 ได้ทำการเก็บข้อมูลส่วนบุคคล ซักประวัติและการตรวจร่างกายโดยละเอียด ผู้ป่วยจะได้รับการทดสอบผิวหนังโดยวิธีการสะกิด โดยสารก่อภูมิแพ้ในอาหารทั้งหมด 20 ชนิด

ผลการศึกษา: ผู้ป่วยจำนวน 51 จาก 76 ราย (ร้อยละ 67.1) ให้ประวัติการเกิดผื่นลมพิษหลังจากที่รับประทานอาหาร โดยมีอาหารที่พบมากที่สุดคือ กุ้ง (ร้อยละ 54.9) และปลา (ร้อยละ 49.0) และผู้ป่วยจำนวน 15 จาก 76 ราย (ร้อยละ 19.7) มีผลทดสอบสารภูมิแพ้ที่ผิวหนังเป็นบวก และในการเปรียบเทียบกับกลุ่มมีผลทดสอบเป็นลบ ทั้งในด้านของอาการ และผลกระทบต่อชีวิตประจำวันไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติ นอกจากนั้นได้ทำการแยกกลุ่มของผู้ป่วยที่ให้ประวัติการเกิดลมพิษที่เกี่ยวข้องกับอาหาร พบว่ามีผู้ป่วยจำนวน 5 จาก 76 ราย (ร้อยละ 6.6) มีผลการทดสอบสารที่ผิวหนังเป็นบวกซึ่งตรงกับประวัติการแพ้อาหาร โดยพบสารก่อภูมิแพ้ในอาหาร คือ ปลา นม มะเขือเทศ กุ้ง และยีสต์ นอกจากนี้ผู้ป่วยจำนวน 51 จาก 76 ราย (ร้อยละ67.1) ให้ประวัติที่สงสัยว่าอาหารกระตุ้นให้เกิดลมพิษแต่เมื่อทำการทดสอบพบผลการทดสอบผิวหนังกลับเป็นลบ ต่างจากผู้ป่วยจำนวน 15 จาก 76 ราย (ร้อยละ 19.7) ซึ่งมีผลการทดสอบผิวหนังเป็นบวก ทั้งที่ผู้ป่วยไม่เคยสงสัยว่าลมพิษที่เกิดขึ้นเป็นจากอาหารใดๆ พบว่าสารก่อภูมิแพ้ในอาหารที่ให้การทดสอบเป็นบวก มีจำนวน 13 ชนิด โดยสามลำดับแรก มีดังนี้ หอยนางรม ถั่วลิสง และมะเขือเทศ เมื่อนำผู้ป่วยที่มีผลการทดสอบสารก่อภูมิแพ้เป็นบวกมาทำการหลีกเลี่ยงอาหารที่ให้ผลบวก พบว่าผู้ป่วยจำนวน 12 จาก 15 ราย (ร้อยละ 80) มีอาการดีขึ้นอย่างมีนัยสำคัญทางสถิติ ทั้งในแง่ของ อาการ ความรุนแรง และผลกระทบต่อชีวิตประจำวัน

สรุป: แม้ว่าการทดสอบสารก่อภูมิแพ้ในอาหารโดยการสะกิดยังคงมีความไวในการวินิจฉัยต่ำ แต่จากการศึกษาครั้งนี้แสดงให้เห็นว่ามีการตอบสนองที่ดีมาก เมื่อนำผู้ป่วยที่มีผลทดสอบเป็นบวกมาหลีกเลี่ยงอาหาร