

Springtime pollinosis and oral allergy syndrome in Sapporo

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Abstract

Objective: The purpose of this present study was to investigate pollinosis in the spring and oral allergy syndrome (OAS) in Sapporo to utilize it for future treatment. **Materials and methods:** Of the patients referred to our out-patient clinic during April and May in 1999, all those that were suspected to have pollinosis were asked to fill in a questionnaire. A 101 patients (30 males and 71 females) with a mean age of 33 years (range 7–74 years) answered the questionnaire. In all, the patients specific IgE tests were performed. **Results:** The most common allergen was birch, affecting 54 of 87 patients (62%). In 61% of patients with birch allergy, we observed fruit and vegetable allergy. Among them, apple was the most prevalent allergen (97%), followed by peach (67%), cherry (58%), pear (40%), plum (40%) and melon (33%). The sensitivity of skin prick test with commercial extract to apple was low (11%). **Conclusion:** Patients with birch pollen allergy had OAS much more frequently than ever reported in Japan, although OAS has not widely been known in Japan. Patients with birch pollen allergy should be informed about the possibility of hypersensitivity to certain fruits. © 2001 Elsevier Science Ireland Ltd. All rights reserved.

Keywords: Birch pollen allergy; Oral allergy syndrome; Fruits and vegetables; Apple

1. Introduction

The climate varies from one region to another in Japan, and each regional vegetation of trees is also unique. In such natural features, the Japanese cedar pollinosis, which is prevalent in the central or southern Japan, is uncommon in Hokkaido, the northernmost island of Japan; on the other hand, birch pollen allergy is very common in Hokkaido, as in northern and central Europe.

It is well known that patients suffering from pollinosis, especially the one provoked by birch pollen, frequently demonstrate an intolerance to a variety of raw fruits, vegetables, and nuts. Among the birch pollen-related food hypersensitivity, apple allergy is highly prevalent [1–3]. In those patients, the reactions such as

oral itching and angioedema immediately appear within a few minutes after ingestion of certain fruits and vegetables. It is suggested that contact with saliva is sufficient to cause the release of food antigens and the antigen can be absorbed directly by the oral mucosa [1]. Local symptoms quickly disappear and are not particularly serious but may be accompanied by manifestations that are either local or systemic, for example, rhinoconjunctivitis, urticaria-angioedema, asthma, and anaphylactic shock [1–3]. The term currently used to describe the complex of clinical feature is oral allergy syndrome (OAS) [4]. This phenomenon is explained by cross-reactive IgE to birch pollen and fruits. Recently, it has been recognized that the major allergen, Betv1 in birch pollen, and a homologous 18 kDa major apple protein are responsible for the majority of allergenic cross-reactions between birch pollen and apples [5–7].

Since the vegetated area of birch is limited in Japan, OAS has been poorly documented until recently [8,9].

The aim of our present study was to investigate spring pollinosis and OAS in Sapporo to utilize it for future treatment.

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Table 1
Questions asked in the questionnaire of medical history

1. When did you notice the symptoms of allergic rhinitis such as runny nose or sneezing spells?
2. Which months of the year do you suffer from allergic rhinitis in?
3. Have you ever noticed itching or the feeling of swelling of the mouth or lip or throat after taking some kinds of food?
(1) If you answered 'yes', which foods cause those symptoms?
☐ Apple, ☐ Peach, ☐ Cherry, ☐ Pear, ☐ Plum, ☐ Melon, ☐ Kiwi, ☐ Strawberry, ☐ Loquat, ☐ Eggplant, ☐ Banana, ☐ Watermelon, ☐ Other
(2) When did you notice it?

Table 2
Age and sex distribution

	Number of cases
Age (years)	
0–9	2
10–19	21
20–29	27
30–39	20
40–49	13
50–59	8
60	10
Sex	
Female	71
Male	30

2. Material and method

Of the patients referred to our out-patient clinic during April and May in 1999, all those that were suspected to have pollinosis were asked to fill in a questionnaire Table 1.

A 101 patients (30 males and 71 females) with a mean age of 33 years (range 7–74 years) answered the questionnaire. The age and sex of these patients are shown in Table 2. In all those patients, specific IgE tests were performed.

Specific IgE antibody was measured in the patients for determination of allergens such as birch, alder, elm, populus, elder, pine, orchard grass, mugwort, apple and house dust mite in the serum by the CAP-RAST FEIA (Pharmacia-Upjon, Uppsala, Sweden). CAP scoring was adapted from the CAP scoring system, as described

Table 3
The number and proportion of patients with positive RAST^a

	Birch	Alder	Elm	Populus	Elder	Pine	House dust mite	Orchard grass	Mugwort
Number with positive RAST/total number tested	54/87	19/45	6/51	5/50	5/44	2/46	37/73	25/42	16/40
%	62	42	12	10	11	4	51	60	40

Table 4
Foods implicated in OAS

Fruits and vegetables	<i>n</i>	%
Apple	32	97
Peach	22	67
Cherry	19	58
Pear	13	39
Plum	13	39
Melon	11	33
Loquat	8	24
Kiwi	6	18
Strawberry	5	15
Eggplant	3	9
Pineapple	3	9
Banana	2	6
Watermelon	2	6
Tomato	1	3

Table 5
Relationship between OAS and birch pollen allergy^a

	Patients with positive RAST to birch pollen <i>n</i> = 54	Patients with negative RAST to birch pollen <i>n</i> = 33
Food sensitivity (%)	32 (61)	1 (3)

^a $P < 0.0005$.

Table 6
Precedence of onset of pollinosis and OAS

	<i>n</i>	%
Pollinosis	15	47
In the same year	9	28
OAS	6	19
Unknown	2	6

Table 7
Sensitivity of commercial extracts skin prick test (CSPT) and RAST of apple in patients with history of allergy to apple

	CSPT	RAST
Number of patients tested	19	11
% of positive patients	11	60

^a Allergens were selected according to the patients' history. Those who had history to the respective allergens were subjected to testing.

in the CAP test kit instructions. Only the results rated 2 or higher were regarded as positive.

For skin test, commercial apple prick test solutions were obtained from Torii (Tokyo, Japan).

We used the Fisher exact test for the comparison.

3. Results

Of the 101 patients, 82 (81%) patients had positive specific IgE to some kinds of allergens. The most common allergen was birch, affecting 54 of 87 patients (62%), while 60% were positive for specific IgE to orchard grass. This was followed by sensitization to house dust mite (51%) and alder (42%) as shown in Table 3.

In all, 33 patients (33%) reported some kinds of allergic symptoms on eating various foodstuffs. Of those, 32 patients (97%) were positive for IgE to birch pollen on the CAP-RAST test. Among them, apple was the most prevalent allergen (97%), followed by peach (67%), cherry (58%), pear (40%), plum (40%), and melon (33%) as shown in Table 4.

In 61% of patients with birch pollen allergy, we observed fruit and vegetable allergy. Compared with this, only 3% of patients without birch pollen allergy had OAS Table 5.

About 15 patients (47%) reported that pollinosis preceded the manifestation of OAS. Nine patients (28%) noticed symptoms of OAS in the same year as the onset of inhalant allergy (Table 6).

The sensitivity of skin prick test with commercial extract to apple was 11%. The sensitivity of RAST was 60% (Table 7).

4. Discussion

In Hokkaido, the Japanese cedar pollinosis is generally less common, except for the limited southern district of the island. However, birch is by far the most important tree allergen and the number of patients with birch pollen allergy has been apparently increasing. In our study, 54 patients (62%) had positive specific IgE to birch pollen. About 19 patients (42%) had positive specific IgE to alder pollen, which had a high correlation with RAST scores to birch pollen [10].

The facts that the vegetated area of birch is limited in Japan and that OAS has no particular association with Japanese cedar pollinosis, which is the most prevalent pollinosis in Japan [11,12], have caused a lack of studies of OAS in Japan until recently, except for some documentations in Hokkaido [8,9], and those in Hanshin area, which report the OAS associated with alder pollinosis [12].

In this study, we based the diagnosis of food hypersensitivity on the answers to the questionnaires. OAS was found in 61% of patients with birch pollen allergy, which is higher than the rate earlier reported in Hokkaido [8,9]. We found that apple, peach, cherry and pear, botanically belonging to the family of Rosaceae, were the fruits most frequently involved as other reports indicated [1–3,13]. Whereas hazelnut is one of the most common food allergen eliciting symptoms in birch pollen allergic patients in Europe [1,13], patients with hypersensitivity to nuts were not found in the present study. It might be due to the fact that the Japanese do not eat nuts very much.

The cross-reactions of allergen-specific IgE antibodies with food allergen and pollen proteins have been considered to be the reason for the clustering of hypersensitivity [1–3,13]. It has also been reported that allergy to grass pollen is closely associated with allergy to melon, banana, watermelon and tomato, and orange [1,14], just as mugwort hay fever is associated with celery OAS [1,15]. In this study, we did not analyze the association between fruits and mugwort or orchard-grass. However, in the future, an investigation of the relationship between fruits and pollen other than birch is desired in Japan.

It is generally understood that pollinosis almost always precedes the appearance of food allergy [1]. About 70% of our patients reported that pollinosis preceded the manifestations of food hypersensitivity, whereas 19% of the patients noticed OAS before symptoms of inhalant allergy. The descriptional difference probably depends on whether the memory of food hypersensitivity symptoms is stronger than that of pollinosis.

Today OAS diagnosis is essentially based on the patient's history, which is usually typical. Ortolani reported that the sensitivity of tests with fresh extract to apple was high while the sensitivity of tests with commercial extracts was extremely low. The author considered it due to a loss of allergenicity during extract preparation [16]. In this study, the sensitivity of skin prick test with commercial extract to apple was low (11%) whereas the sensitivity of RAST was 60%.

Although OAS has not been widely known in Japan, patients with birch pollen allergy should be informed about the possibility of reactions with such fruits as apple, peach, cherry and pear. However, they would probably tolerate the foodstuffs when boiled or tinned, because heating, and even freezing destroys the allergenicity of fruits and vegetables [3].

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