

Allergic Reactions Following Skin Contact With Fish

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ABSTRACT

We evaluated the clinical characteristics found in 29 children who showed allergic symptoms after direct and/or indirect contact with fish, from 197 children diagnosed with IgE-mediated fish hypersensitivity. Allergic reactions to fish through ingestion began in most patients (79%) within the first 24 months of life. All the patients showed cutaneous symptoms, either alone or associated with other clinical manifestations. Whiff and hake were the species more frequently implicated in eliciting clinical manifestations upon ingestion. After diagnosis, all patients were placed on a strict fish avoidance diet. During this period of avoidance, 29 patients reported allergic reactions (mean age 5 years, 6 months; SD 4 years, 2 months) after incidental skin contact with fish. Clinical manifestations after touching fish were only cutaneous in 28 of the 29 studied patients. One showed local urticaria with wheezing. The majority reported two or more episodes. Incidental skin contact with fish could play an important role in accidental encounters with fish particles in children on a fish avoidance diet for fish IgE-mediated hypersensitivity. Such exposures could result in immunologic immediate contact reactions and in some cases could lead to systemic reactions (contact urticaria syndrome). (Allergy and Asthma Proc 17:83–87, 1996)

Fish allergy is a common problem in fish-eating and fish-processing communities. In Norway, where a large percentage of the population works for fishing and associated industries, and where fish is a mainstay of the daily diet, the prevalence of fish allergy reaches 1/1000 of the general population, and it is estimated to be greater in children and young adults.¹ In Sweden, 39% of all pediatric

patients with food allergy have fish allergy.² In Madrid, 30% of all pediatric patients with food hypersensitivity had symptoms related to fish ingestion, and this allergen has held second place (after egg) in prevalence among sensitizing foods.³

In our environment, the most significant fish in children's diets are those which are fatless; the most commonly consumed fish species are whiff, sole, and hake. Therefore, adverse reactions to fish are usually related to these species, which are largely unknown to allergists in other countries. In Spain, by contrast, the consumption of fresh or dried codfish, more widely known as an allergen elsewhere, is infrequent in children and relatively uncommon in adults.

De Besche⁴ published the first report describing fish as an inhalational allergen, able to trigger asthma and elicit immediate skin symptoms on contact.

Although alimentary urticaria and other IgE-mediated reactions to fish usually occur after ingestion, several cases of allergic reactions to fish through contact have been reported, mainly in atopic subjects.^{5,6} Food handlers and seafood workers have the highest risk for developing fish contact urticaria.⁷ In addition, skin symptoms through contact with fish had been previously reported in a nonoccupational fashion.⁸

In a previous work, we reported the clinical characteristics of patients with allergic reactions associated with fish airborne particles.⁹ In this article, we evaluate the clinical characteristics of fish skin contact in 29 IgE-mediated fish hypersensitive patients.

SUBJECTS AND METHODS

Subjects

We selected our study population from 197 children diagnosed with IgE-mediated fish hypersensitivity at La Paz Children's Hospital (Madrid, Spain). The diagnosis of allergic reaction to fish through ingestion was based on suggestive clinical history, open fish challenge, and fish-

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specific IgE demonstrated by skin prick test and RAST. The clinical symptoms were evaluated as in a previous report,¹⁰ and the open fish challenge was carried out following the protocol outlined in a previous publication.¹¹

Once diagnosed, all patients were put under a strict fish avoidance diet, and they were followed-up for periods of 1 to 13 years. In the reevaluation, carried out every year, they were asked about incidental contact with fish, according to a prospective protocol. Diagnosis of immediate contact reaction to fish was established when reported symptoms appeared from a few minutes to an hour after the eliciting fish come into contact with the skin.

Only if they were previously asymptomatic and the allergic reaction was elicited after skin contact with fish, directly or indirectly, was the diagnosis of allergic contact reaction to fish established.

Materials

Fish allergenic extracts used were of two kinds: 1) Commercial extracts of codfish, trout, and tuna fish (Bencard-Bayer, Germany; Leti, Spain); 2) extracts produced from fish not commercially available such as hake, whiff, sole, swordfish, and sardine. Fish extracts prepared in La Paz Children's Hospital Immunoallergy Laboratory were extracted in PBS, defatted, dialyzed, and lyophilized. Extracts were reconstituted to 10 mg/mL in PBS-glycerol for prick test and to 1 mg/mL for binding to cellulose CN bromide-activated disc for RAST.

Procedures

Standard skin prick tests were performed by applying a drop of glycerinated fish extract (10 mg/mL) on the palmar surface of the forearm. Isotonic glycerol saline and histamine chloride (10 mg/mL) were used as negative and positive controls respectively. Results were recorded after 15 minutes. The results was considered to be positive when a fish allergen extract elicited a wheal at least 3 mm greater than the negative control prick.

The serum concentration of specific IgE was determined by a immunoenzymatic method Phadezym RAST (Pharmacia Diagnostic, Sweden). The result were expressed by

classes (0–4) and PRU/mL (0.35–17.5 PRU/mL), according to the manufacturer's instructions.

RESULTS

Of 197 children diagnosed with IgE-mediate fish hypersensitivity related to fish ingestion and placed on fish avoidance diet, 29 (14.8%) reported immediate contact reactions to fish. In addition, 26 of 29 patients with immediate contact reactions suffered from other allergic disorders: Atopic dermatitis (AD) either alone or associated with allergic asthma and/or rhinoconjunctivitis (17 patients); allergic asthma and/or rhinoconjunctivitis (7 patients); food hypersensitivity with other foods than fish (2 patients) (Fig. 1). In 17 children with AD, this disease was diagnosed before the appearance of skin contact symptoms elicited by fish. Six patients reported hives with other foods than fish, three of them suffering from atopic dermatitis. Other agents different from food were not considered to cause immediate cutaneous symptoms.

The symptoms observed during the allergic reactions through ingestion are shown in Table I. All the patients had acute skin symptoms. In six (21%), cutaneous reaction was associated with gastrointestinal symptoms, and in five of 29 (17%) with respiratory symptoms. Two patients showed only oropharyngeal symptoms after ingestion of fish, including oral pruritus, lips angioedema, and throat tightness. They were diagnosed as having an oral allergy syndrome.

The fish species implicated in the clinical manifestations by ingestion were identified in 21 of 29 patients as: whiff (10), hake (6), sole (2), sardine (2), and tuna (1).

The age at onset of clinical manifestations was from 6 months to 14 years (mean age 22 months, SD 29,8) (Fig. 2).

All 29 children showed sensitization to several fish species by both skin prick testing and RAST (Table II).

As shown in Table III, clinical manifestations following skin contact with fish were mainly cutaneous, and the vast majority of patients showed only localized symptoms. Only one child, with a previous history of allergic asthma and atopic dermatitis, presented with local urticaria and wheezing after indirect skin contact with fish.

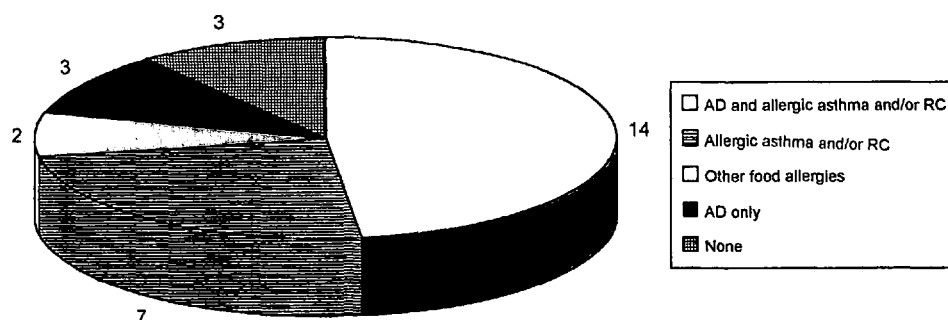


Figure 1. Other allergic diseases diagnosed in the 29 patients with contact reactions to fish. AD = atopic dermatitis; RC = rhinoconjunctivitis.

TABLE I

Clinical Manifestations of Fish Ingestion in 29 Fish-Allergic Patients Who Showed Immediate Contact Reactions to Fish

Clinical Manifestations	Number of Patients (%)
Urticaria and/or angioedema	16 (55%)
Cutaneous and gastrointestinal symptoms	6 (21%)
Cutaneous and respiratory symptoms	5 (17%)
Allergy oral syndrome	2 (7%)

In all cases, the reactions appeared within a few minutes after the fish skin contact and disappeared within a few hours.

Fish contact reactions were elicited by touching fish directly in 41% of the patients, or indirectly in 32%. Indirect contact with fish resulted in symptoms when patients touched a napkin or a fork from persons who were eating fish or when these persons touched or kissed them. In eight patients (27%), either direct or indirect local contact triggered symptoms.

Clinical manifestations were caused from both cooked fish (79%) and raw fish (21%).

Accidental exposure was implicated in eliciting immediate contact reactions, and these accidental encounters with fish happened mainly at home. Twenty-four patients (83%) reported two or more episodes. The main species implicated were codfish, whiff, sole, and tuna. There was no significant difference among fish species eliciting contact symptoms. On the other hand, fish species that were reported to cause immediate contact reactions in some cases were different from those implicated in clinical manifestations through ingestion.

The age at onset of clinical manifestations by fish contact was from 8 months to 14 years (mean age 5.5 years, SD 4.12) (Fig. 2).

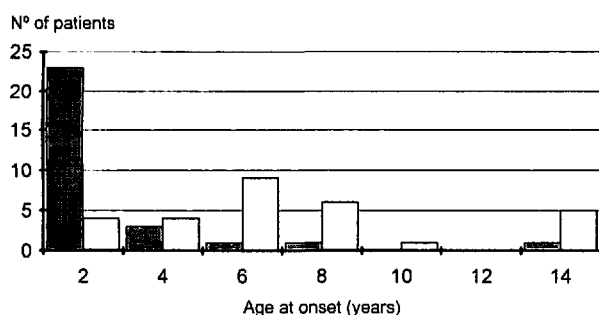


Figure 2. The age distribution of onset of allergic clinical symptoms. Shaded bars: Through fish ingestion (mean age 1.8 years, SD 2.5). White bars: After fish skin contact (mean age 5.5 years, SD 4.1).

DISCUSSION

IgE mediated hypersensitivity reactions to fish are a relevant clinical problem, particularly in some countries of Europe where fish is an important component of the diet. In the Mediterranean area, fish allergy is estimated to occur in 4–5/1000 children from the general population¹² and in 30% of children with food hypersensitivity.³

Clinical manifestations of fish hypersensitivity are more often elicited through ingestion, starting mainly in the second year of life. In addition, allergic reactions in fish-hypersensitive patients may be triggered by incidental inhalation of airborne fish particles, after exposure to vapors, fumes of volatile particles from fish,⁹ or by skin contact to fish.^{5,13,14} The latter should be considered as immediate allergic contact reactions in individuals who had previously become sensitized to fish.

Allergic reaction to fish through ingestion began in the majority of the evaluated patients before 24 months of life. All of the 29 patients included in our study showed cutaneous symptoms related to fish ingestion, either alone or associated with other clinical manifestations. Two of them had only oropharyngeal symptoms after fish ingestion and were diagnosed as having oral allergy syndrome. This syndrome can be a form of skin contact reaction.

Whiff and hake were the principal fish species eliciting symptoms through ingestion. The reason could be that these are the most common fish in children's diet in our area. However, all patients were sensitized to multiple fish species, a fact that can be attributed to the high cross-reactivity between the fish species previously reported.¹⁵

As described by Geo Von Krogh,¹⁶ food allergens may penetrate into intact skin, triggering immunologic contact urticaria. Immediate contact reactions of the skin in the form of various types of contact urticaria have promoted increasing interest in clinical works and research during the last 15 years. Immunologic contact urticaria is an immediate allergic reaction occurring in individuals who have previously become sensitized to the causing agent. Allergic reactions following skin contact to fish mainly had been reported in food handlers.^{7,13,17} Out of occupational exposure, some IgE-mediated contact reactions to fish had been reported,¹⁴ but the potential extension of this problem has not been thoroughly evaluated in large groups of subjects.

In our study, all the patients had previously reported allergic symptoms after fish ingestion (mean age, 22 months) and were diagnosed with IgE-mediated fish hypersensitivity, then they were placed on a strict fish avoidance diet. After a period from 4 months to 14 years, (mean 3.7 years, SD: 1.64) they showed clinical manifestations after indirect or/and direct skin contact with fish. The sensitization in these patients likely occurred *via* the gastrointestinal tract.

Different degrees of clinical response can be observed in contact urticaria. Local erythema and itching constitute the weakest type of reaction. Local wheal and flare represent

TABLE II

Skin Prick Tests (SPT) and RAST Results in 29 Patients

	SPT			RAST		
	Positive	Negative	Number done	Positive	Negative	Number done
Whiff	25	3	1	20	8	1
Codfish	25	4	0	22	6	1
Sole	23	4	2	17	9	3
Hake	26	1	2	19	1	9
Tuna	23	5	1	9	20	0
Trout	8	1	20	2	2	25
Swordfish	6	8	15	6	1	22
Sardine	13	2	14	16	1	12

the prototypic clinical manifestation. In the more severe form, local skin contact results in generalized urticaria or systemic symptoms. For these cases, Maibach and Johnson proposed the term contact urticaria syndrome.⁶ The vast majority of the patients included in our study (28 of 29) had only dermatologic reactions following contact with fish (erythema, urticaria or angioedema). Among the 29 children included in this study, one reported clinical manifestations beyond the skin. He presented acute asthma and local urticaria immediately after indirect fish skin contact.

Most of the skin contact reactions happened at home, where other persons were cooking or eating fish, and none of them occurred from industrial exposure.

Some authors have reported a higher incidence of contact urticaria to food in patients who suffered from atopic dermatitis.^{5,8,18} Von Krogh, in a clinical review about contact urticaria syndrome, stressed the concept that eczematous skin, due to its impaired barrier to penetration, may be more susceptible to contact than healthy skin.¹⁶ In our study, seventeen (59%) of 29 patients suffered from atopic dermatitis, and we did not find clinical differences between patients with AD and those with healthy skin. The reason could be that AD was attributed previously to fish eliciting contact symptoms, and at this time AD had cleared in some of the children.

Possible pathogenic mechanisms in skin contact reactions is mast cells' histamine release after immunological stimuli

or nonspecific ones. The rapid onset and the clinical characteristics of the symptoms after fish skin contact, the previous diagnosis of IgE-mediated fish allergy by ingestion and the positives SPT and/or RAST, support an immediate immune mechanism in our patients.

Besides ingestion, inhalation of airborne fish particles or cutaneous contact with cooked or raw fish can elicit clinical symptoms in IgE-mediated fish hypersensitive patients. Incidental skin contact can be inadvertent and could lead to several grades of immediate immunological contact reactions, including systemic symptoms. Fish allergic patients should also be advised about direct and indirect skin contact avoidance, apart from a strict fish avoidance diet.

In conclusion, we report on 29 patients diagnosed with IgE-mediated fish hypersensitivity, who had immediate contact allergic symptoms after skin contact with different fish species. In addition to a fish avoidance diet, these incidental skin contacts with fish should be taken into account in fish-allergic patients.

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TABLE III

Clinical Symptoms in 29 Patients with Immediate Contact Reactions to Fish

Clinical Symptoms	Number of Patients (%)
Local itching and erythema	3 (10%)
Contact urticaria and/or angioedema	25 (86%)
Contact urticaria and wheezing	1 (3%)

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