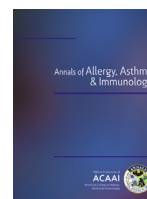




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Letter

Angler fish is not an alternative in allergy to multiple fish species

Fish allergy is one of the most frequent food allergies.¹ Its prevalence is highest in those regions where consumption is greatest. Spain has one of the highest fish intakes per inhabitant and, as a result, fish allergy is a serious health problem.

Fish-allergic patients are usually allergic to many species of fish, resulting in the recommendation that they avoid all types of this important food source. Apart from the complex problems involved in avoiding a food that is so frequent in diets, patients must abstain from eating a nutrient that is currently considered very beneficial.

To mitigate these problems, studies have investigated whether some species could be better tolerated by patients. For example, it is well known that swordfish can be an acceptable alternative for some patients. The reason for this seems to be related to the lower expression of parvalbumins in this species.²

The genus *Lophius* is found all over the world (eg, American angler [*Lophius americanus*] and angler [*Lophius piscatorius*]). In Europe and North America, the tail meat of fish of this genus, known as monkfish or goosefish (North America), is widely used in cooking. In Asia, especially Korea and Japan, it is a delicacy. Because cases of allergy to angler fish have not been reported in the literature, we analyzed 5 patients with allergy to multiple fish species to determine whether angler fish might be an alternative they could tolerate.

The 5 patients were 11 to 28 years old. Four were female and 1 was male. All presented a clinical picture of immediate systemic allergic reactions: 3 with urticaria or angioedema, 1 with bronchospasm, and 1 with abdominal symptoms after fish intake (hake, sole, tuna, perch, and sardine). Two patients also presented with oral allergy syndrome, 1 with contact urticaria, and 1 with dyspnea after smelling the cooking vapors of the fish. Each patient exhibited symptoms with several of the fish listed. Four patients could tolerate swordfish. Prick-by-prick skin test reactions (pricking the fish muscle and then using that prick device to prick the subject) were positive for those fish (raw and cooked) for which each patient reported symptoms. ImmunoCAP test (ThermoFisher, Uppsala, Sweden) against the cod parvalbumin rGad c 1 was positive in all patients (range 2–5 kU/L).

The prick-by-prick test reactions with raw and cooked angler fish were positive in 3 patients who developed papules measuring 20 × 6, 10 × 8, and 6 × 6 mm, respectively. In the other 2 patients, these test results were negative. In the open oral challenge test, all 5 patients presented an immediate positive reaction: 4 had oral allergy syndrome and 1 had urticaria with oral allergy syndrome.

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To study the allergens involved, fish extract was prepared from angler fish muscle as previously described.³ Proteins were separated by sodium dodecylsulfate polyacrylamide gel electrophoresis, and specific IgE-binding bands were evaluated by immunoblotting. Incubation with patients' sera showed proteins with a molecular weight ranging from 10 to 100 kDa, which were identified by mass spectrometry as previously described.⁴ IgE-binding bands in angler fish extract corresponded to parvalbumin (10 and 14 kDa), myosin light chain (19 kDa), aldolase (42 kDa), α -actin (44 kDa), enolase (48 kDa), and aldehyde dehydrogenase (50 kDa; Fig 1). IgE-binding bands of approximately 45 and 95 kDa appeared in all lanes and corresponded to unspecific bands; therefore, these bands were not identified. There are patients with positive ImmunoCAP reactions to parvalbumin, but the protein cannot be recognized in immunoblot or the binding appears very faintly (as in patient 1). This fact is likely due to the exposure time.

In the literature review performed, we found only 1 published case of allergy to angler fish. This was a fisherman with contact urticaria to the fish but who could eat it without any effect. The prick-by-prick test reaction was positive and immunoblotting disclosed IgE-binding bands of 37 to 50 kDa.⁵ This almost complete lack of reports of angler fish allergy is surprising given the worldwide distribution of the fish and its high levels of consumption. One partial explanation is that because other fish (hake, sole and others) are more common and these are the species that first cause symptoms, patients subsequently avoid fish in general and thus are not exposed to other less frequently consumed species. This was the situation for the present patients.

The patients in this study who were allergic to angler fish had mild symptoms. We believe this is due to the fact that patients underwent a challenge test, and this was logically stopped after the first symptoms appeared. In a real-life situation, more fish would be ingested and the symptoms probably would be more intense.

Parvalbumins are the most important fish allergens. Based on the high amino acid sequence identity of these proteins from different fish, cross-reactivity among species occurs frequently.² In the present series, all patients presented specific IgE against parvalbumins. We identified other IgE-binding proteins in angler fish, such as myosin light chain, aldolase, α -actin, enolase, and aldehyde dehydrogenase. Recently, enolase and aldolase have been reported to be new allergens in cod, salmon, and tuna,^{6,7} as has myosin light chain from cod and Nile perch, and in the latter, aldolase and actin.⁸

Further studies are needed to verify the role these new allergens play in the cross-reactivity among different fish species. Kuehn et al⁶ reported an interspecies cross-reactivity for enolase and aldolase, although limited, among cod, salmon, and tuna.

In conclusion, these results offer no support for the use of angler fish as an alternative in patients with allergies to multiple fish species.

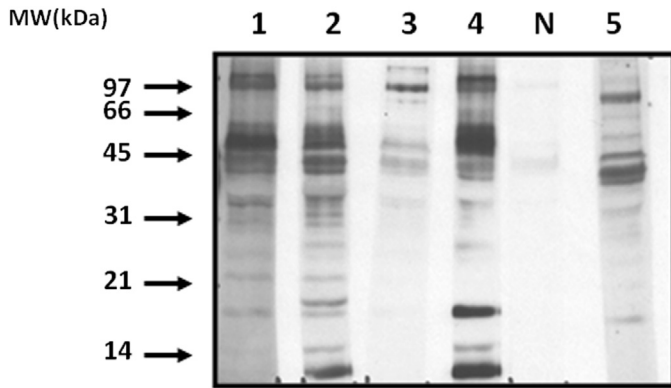


Figure 1. IgE-binding bands in raw angler fish extract by immunoblotting. Lanes 1 through 5 represent serum from 5 patients. Lane N represents a negative control of pooled sera from nonatopic patients. MW, molecular weight.

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