

Case Report



A case of anaphylaxis after ingestion of *Liparis tanakae*

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Conflict of Interest

The authors have no financial conflicts of interest.

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ABSTRACT

Liparis tanakae is a kind of fish in the northwestern Pacific Ocean and sometimes it is used for broth or frozen fish fillets on markets in Korea. A 45-year-old female patient visited Emergency Department because of facial edema, generalized urticaria, dyspnea, and hypotension after eating *L. tanakae* broth. She recovered after administration of epinephrine. Seven weeks later, she experienced generalized urticaria again after tasting a spoon of *L. tanakae* broth. In 2 months after recovery, the patient showed positive response to skin prick tests with *L. tanakae* extract. She also showed positive response to skin prick test with cod which did not induce any symptoms after oral ingestion. The patient was diagnosed as *L. tanakae* induced anaphylaxis based on the repeated clinical history and skin prick test results. We herein report the first case of *L. tanakae* induced anaphylaxis.

Keywords: Anaphylaxis; Food allergy; *Liparis tanakae*

INTRODUCTION

Fish and seafood are common causes of food allergy in worldwide [1]. Some regions in Asian countries have higher rates of seafood consumption than others and fish allergy is more common in this area [2]. Since kinds of fish show regional difference, it is not strange that common causative fish for food allergy is different according to the habitat of fish.

Liparis tanakae (Korean name: kkomchi, scientific classification depicted in **Table 1**) is a kind of fish which is mainly distributed over the northwestern Pacific Ocean, specifically the sea along the coast of Korean peninsula (Yellow Sea, East Sea), East China Sea, Sea of Okhotsk, Pacific

Table 1. Scientific classification of *Liparis tanakae* and Cod

Scientific classification	<i>Liparis tanakae</i>	Cod
Kingdom	Animalia	Animalia
Phylum	Chordata	Chordata
Class	Actinopterygii	Actinopterygii
Order	Scorpaeniformes	Gadiformes
Family	Liparidae	Gadidae
Genus	<i>Liparis</i>	<i>Gadus</i>
Species	<i>Liparis tanakae</i>	

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coast of Japan to northern Kuril Islands. In Korea, it is used for the broth or frozen fish fillets on market. There has been no report of *L. tanakae* induced allergy in the world to the present.

CASE REPORT

A previously healthy 45-year-old female visited Emergency Department because of severe facial edema, generalized urticaria, itching, and dyspnea 3 hours after eating a broth made of *L. tanakae*. On arrival to the Emergency Department, she presented with loss of consciousness. Physical examination revealed a blood pressure of 41/29 mmHg, a pulse rate of 90/min, a respiratory rate of 22/min, oxygen saturation of 98%. She was immediately treated with epinephrine (0.4 mg, intramuscular), methylprednisolone (125 mg, intravenous), chlorpheniramine (4 mg, intravenous). Symptoms resolved gradually for 1 hour, with restoration of normal vital signs and physical examination findings.

Seven weeks later, she experienced generalized urticaria again after tasting only a spoon of *L. tanakae* broth.

The patient was referred to our allergy clinic for the long-term management of anaphylaxis. She had suffered seasonal allergic rhinitis for several years. History of food allergy and current medication were denied by the patient. There was no family history of food or respiratory allergy and she was working as a school teacher. Skin prick test with common 55 food allergens showed positive responses to cod and sweet potato (wheal size of 4.0 × 4.0 mm and 3.0 × 3.0 mm, respectively, and 3.5 × 3.5 mm to histamine). However, these foods never induced any symptoms by oral ingestion. For skin prick test and measurement of specific IgE against *L. tanakae* in serum, frozen *L. tanakae* were obtained from the restaurant and the extract of this fish was prepared by a method described previously [3]. The result of skin prick test was positive to the extracts which were made of the flesh of *L. tanakae* (wheal size 4.0 × 3.5 mm). The serum specific IgE antibodies to *L. tanakae* were measured using an enzyme-linked immunosorbent assay (ELISA), which showed marked elevation in the patient compared to 5 healthy controls never exposed to *L. tanakae* previously (Fig. 1A). Competitive ELISA inhibition test was performed by cod extract which induced positive response on skin prick test with common food allergens. The inhibition tests showed dose-dependent

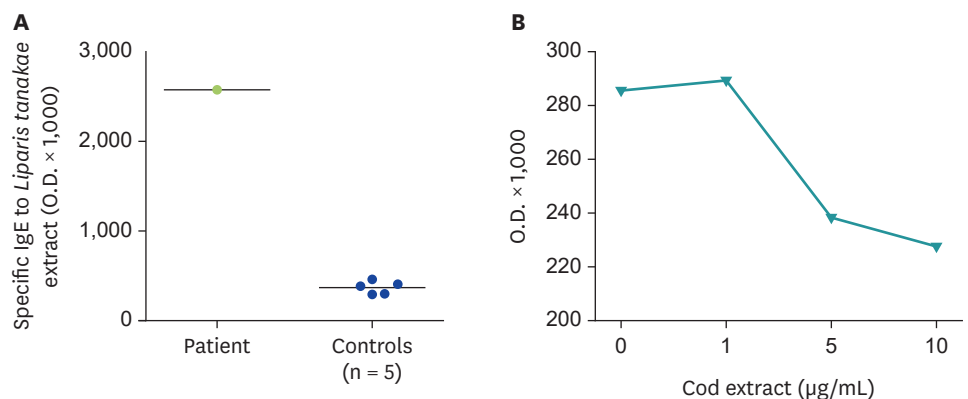


Fig. 1. (A) Serum levels of the specific IgE antibodies to *Liparis tanakae*, as determined by using an enzyme-linked immunosorbent assay (ELISA). Marked elevation was detected in the patient compared to 5 healthy controls who were neither exposed to *L. tanakae* nor had a history of food allergy. (B) Inhibition test of *L. tanakae* with serial addition of cod extract. ELISA inhibition testing showed dose-dependent inhibition by cod extract.

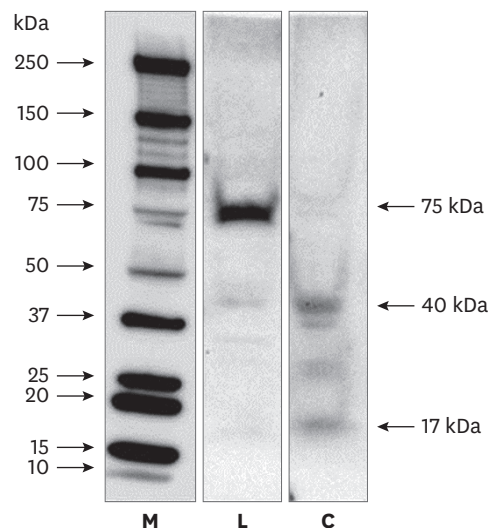


Fig. 2. Immunoblot analysis of *Liparis tanakae* and cod extract with the patient's serum. Two specific IgE binding components at 40 and 75 kDa in *L. tanakae* extract and 17 and 40 kDa in cod extract. M, protein molecular size marker; L, *Liparis tanakae* extract; C, cod extract.

partial inhibition of specific IgE binding to *L. tanakae* extract by the addition of cod extract (Fig. 1B). To identify IgE-producing components in *L. tanakae* and cod extract, serum protein was separated by 12% sodium dodecyl sulfate-polyacrylamide gel electrophoresis (Fig. 2). Immunoblot analysis revealed 2 specific IgE binding components in *L. tanakae* extract. While a very weak band was observed at 40 kDa, a band found at 75 kDa was strong and considered as a main allergen. In cod extract, 2 protein components were bound to IgE at 17 and 40 kDa. Oral challenge test with cod was performed to rule out allergic reaction to cod but cod did not induce any symptoms in the patient. The diagnosis of *L. tanakae* induced anaphylaxis was made and the patient was advised life-long complete avoidance of *L. tanakae*.

DISCUSSION

Food is one of the main causes of anaphylaxis treated in the Emergency Department around world [4]. For the evaluation and complete avoidance of the causative allergen, careful history taking is the most important and guides allergy tests for detecting a trigger agent. Skin test with extract of suspicious food and *in vitro* evaluation of allergen-specific IgE are commonly used in clinical practice. Food challenge test can be performed with consideration of the severity of the reaction [5].

The prevalence of seafood allergy is usually higher where the seafood consumption is high. Crustacean and fish are considered as the most common provoking factor of severe food anaphylaxis [6]. According to the study by Yang et al. [7] on the incidence and mortality rate of anaphylaxis in Korean patients who visited the allergy clinic and Emergency Department, 21.0% was induced by food including 2.9% of seafood. In Japan, Iikura et al. [8] reported that seafood was one of the most common food allergen (frequency 10.6%) in children experienced immediate-type food allergy.

Several studies reported cross-reactivity between cod and other fish like eel, pout, and tuna [9, 10]. A 12 kDa Gad c I protein, the major allergen from cod, belongs to a family of Ca^{2+} -

binding protein and is considered as an important allergen related to cross-reactivity between different kinds of fish [9, 10]. Reports of monosensitivity to one fish species show that these patients do not have IgE to Gad c I [11, 12]. Although our patient has positive reaction to cod allergen in the skin prick test, she had no history of allergy to cod or other fish such as eel or pout. Immunoblot analysis showed that the IgE binding 12 kDa Gad c I protein did not exist in the serum of the patients and the weak band at 40 kDa may explain the cross-reactivity to cod in skin test.

L. tanakae is used for cooking ingredient in some Asian countries and distributed as a salted or frozen fillet in the markets under the name of Asian blue cod fish from China. However, there is no report of *L. tanakae* related food allergy. The patient in this case report was diagnosed as *L. tanakae* induced anaphylaxis based on the repeated clinical history and presence of specific IgE. We hereby reported the first case of *L. tanakae* induced anaphylaxis.

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