

## Food Protein–Induced Enterocolitis Syndrome: Results of a Spanish Survey

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J Investig Allergol Clin Immunol 2023; Vol. 33(2): 134-136  
doi: 10.18176/jiaci.0828

**Key words:** Food allergy. Food protein-induced enterocolitis syndrome. FPIES. Spain. Survey.

**Palabras clave:** Alergia a alimentos. Síndrome de enterocolitis inducida por proteínas de la dieta. FPIES. España. Encuesta.

Food protein-induced enterocolitis syndrome (FPIES) is a non-IgE-mediated food allergy characterized by delayed and reproducible gastrointestinal symptoms. It is a heterogenous disorder with a wide spectrum of clinical phenotypes [1]. The typical symptoms and the triggers vary depending on age at onset and geographic area [2]. The aim of this study was to establish the characteristics of FPIES and its clinical management in Spain.

An online cross-sectional survey was completed by members of the Spanish Society of Allergy and Clinical Immunology (SEAIC) and of the Spanish Society of Paediatric Clinical Immunology, Allergy and Asthma (SEICAAP). The survey (online repository text) was created using SurveyMonkey. It was launched in early March 2020 and ended in July 2020. The data were entered into an anonymized database. The survey was completed by 122 physicians (Table E1).

Most of the participants (74.4%) only treat pediatric patients diagnosed with FPIES, 4.9% only adults, and 20.7% both. Most (81.2%) used the diagnostic criteria proposed by international consensus guidelines [3].

Almost all physicians (90%) carried out an oral food challenge (OFC), as follows: 41.7% during follow-up to verify tolerance to the offending food, 16.7% to check tolerance to other foods, 24.1% in both cases, and 7.5% only for diagnosis. The period they considered adequate to perform the OFC varied according to patient age, food involved, and purpose of the OFC, although most waited until 12-18 months after the last reaction. The OFC was performed by giving several equal doses on the same day—following the consensus recommendations—in 39.1% of cases, while it was performed on the same day or over 2 days, but at increasing doses, in 36.5% of cases. Only 15% performed it by administering a single dose per day on 2 different days. Most clinicians (77.5%) inserted a peripheral line before the OFC, although only 31% of them always did so.

Fish was the food most frequently involved in FPIES in children, followed by cow's milk protein (CMP) and egg, while in adults the most frequent triggers were fish and shellfish. In fish-induced FPIES, most respondents (62.2%) performed OFC using an alternative fish, with canned tuna being the most frequent, followed by swordfish and salmon. However, in FPIES induced by shellfish and cereals, only 33.3% and 32.3% of the respondents, respectively, carried out the OFC with an alternative. Cephalopods were the most frequently used in the case of shellfish, followed by bivalves. In the case of cereals, the alternatives were corn and rice. Interestingly, in CMP-FPIES, 14.2% of the respondents used cooked milk as the first option in the OFC, and in egg-induced FPIES, 28.1% carried out the challenge with baked forms. As to the acquisition of tolerance, most respondents (36.5%) reported that the age of tolerance was 2-3 years with CMP-FPIES, >3 years in the case of hen's egg and cereals (50.5% and 53.9% respondents, respectively), and >5 years for fish (64.7%) (Table). Finally, the acute reaction was treated in most cases (40.5%) using intravenous fluid replacement, ondansetron, and corticosteroids.

FPIES is a heterogenous disease not only in terms of its clinical presentations (acute, chronic, atypical, adult-onset) [1], but also in terms of age and geography, leading various foods to be more prevalent in some populations than in others [2]. These differences are highly relevant when attempting to establish an accurate diagnosis, treatment, and diet. Our study describes the characteristics of patients with FPIES in Spain. The survey, which was answered by a representative sample of physicians from throughout the country, provides a global vision of the disease in Spain. FPIES is considered an infrequent disease. The few available prospective epidemiological studies estimated incidence to be 0.34%-0.7% in children and 0.2% in adults [4]. In our study, one-third of the respondents perceived FPIES as a common disease and, even though most of the cases they treat involved children, up to 25% of physicians had adult patients with FPIES. Therefore, FPIES is probably a more frequent disease in this age group than reported to date.

Diagnosis is based on clinical history. Several sets of unvalidated diagnostic criteria have been published to assist in clinical diagnosis [5]. Interestingly, 80% of the physicians surveyed found the most interesting criteria to be those of the international consensus guidelines [3]. This is striking, since Vazquez-Ortiz et al [6] showed that based on these criteria,

Table. Triggers, Alternative Foods, and Resolution Rates

Trigger		Alternative food	Resolution rates in children by age, y			
Children	Adults		Fish	<1 (1%)	Egg	<1 (1%)
Fish (47%)	Fish (50.8)	Canned tuna, swordfish, salmon	1-1.5 (0%)		1-1.5 (3.1%)	
Milk (44.4%)	Shellfish (27.1%)		1.5-2 (2.9%)		1.5-2 (20.6%)	
Egg (7%)	Milk (10.2%)		2-3 (2%)		2-3 (24.7%)	
Rice (0.8%)	Cereals (5.1%)	Cooked milk	3-4 (13.7%)		> 3 (50.5%)	
Shellfish (0.8%)	Legumes (3.4%)	Baked egg	4-5 (15.7%)			
	Mushrooms (3.4%)	Corn or rice	>5 (64.7%)			
		Cephalopods or bivalves	Milk <1 (1.9%)	Cereals <1 (5.2%)		
			1-1.5 (25%)		1-1.5 (5.2%)	
			1.5-2 (17.3%)		1.5-2 (15.8%)	
			2-3 (36.5%)		2-3 (19.7%)	
			> 3 (19.2%)		> 3 (53.9%)	

25% of pediatric patients would not be correctly diagnosed. In the case of adults, diagnostic yield would be even worse, since, according to published series, vomiting may be absent in many patients, leading up to 50% of adults with FPIES to go undiagnosed [7]. In the latest published criteria [5], crampy abdominal pain, a very common symptom in adults, replaced vomiting in this age group.

In our study, the most common offending food in children was fish, followed by milk and hen's egg, while the most common in adults were fish and shellfish. These data agree with those reported elsewhere [3]. However, vegetable-induced FPIES does not seem to be so infrequent in Spain, since almost 40% of the respondents treat patients with FPIES caused by vegetables, especially legumes. Interestingly, soy FPIES, which is frequent in other countries, is extremely rare in Spain [2], although mushroom seems to be an emerging trigger.

Regarding OFC, most professionals choose to administer several doses of food at variable time intervals throughout the same day. This recommendation has proven to be meaningless, except for the case of atypical FPIES, as a dose of 25% to 33% of the standard serving size is sufficient to trigger a reaction in most FPIES patients [8].

The age at which Spanish children outgrow their FPIES is similar to that described elsewhere in the world [9]. However, this finding may be subject to bias, since OFC is performed at long intervals (12-18 months) and prospective studies are lacking.

While it has been shown that most children in southern Europe had single FPIES and that it is possible to tolerate other foods from the same group, only 18% of the respondents performed the OFC to verify tolerance to these foods [10,11].

In conclusion, this national survey has enabled us to establish areas for improvement in the coming years, specifically in diagnostic criteria and how and when to perform the OFC.

#### Acknowledgments

We would like to thank the following for their corrections and contributions to both the survey and the manuscript: M<sup>a</sup> Isabel Alvarado Izquierdo, Sandra Blanco Bermejo,

Inmaculada Cerecedo Carballo, Angelica Feliú Vila, Sara Fernández Cortés, Purificación González Delgado, Hilda Rianec Hernández Suárez, Eva M<sup>a</sup> Lasa Luaces, Marta Reche Frutos, Elena Rodríguez Platas, Francisco Javier Ruano Pérez, and M<sup>a</sup> Soledad Terrados Cepeda.

#### Funding

The survey was funded by the SEAIC Foundation.

#### Conflicts of Interest

The authors declare that they have no conflicts of interest.

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■ *Manuscript received March 22, 2022; accepted for publication May 20, 2022.*

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