

Nonresponsive Celiac Disease Due to Inhaled Gluten

TO THE EDITOR: Celiac disease is a gluten-induced enteropathy, the treatment of which consists of permanently withdrawing dietary gluten. Adherence to diet is crucial for intestinal mucosal recovery, relief of symptoms, and prevention of intestinal T-cell lymphoma.¹ The amount of gluten needed to cause mucosal injury varies. Some patients can tolerate up to 5 g of gluten daily; others have intolerance after minimal exposure.

Two patients, both living in farming communities, were referred with nonresponsive celiac disease. Characteristics of the patients are shown in Table 1. Despite strict gluten-free diets, their symptoms and histologic changes persisted. Both were feeding cattle in enclosed spaces on a daily basis. After wearing face masks, one patient had definite histologic improvement, with nearly normal findings, whereas the other patient had mild histologic improvement without resolution but with dramatic improvement in symptoms.

The feeds used by both patients were supplements to hay silage and grass for lactating cows and young calves. A standard 25-kg bag contains 30% barley, 11% maize, 11% wheat, and 12% soybean extracts, with the remainder being pulp, sugar-cane molasses, calcium carbonate, sodium chloride, and palm oil. At production, feeds are subjected to the Holmen tester,² which tests the

durability of the feed in terms of remaining whole and ensures a minimum hardness level of 94%, with 6% escaping as dust particles. With an average daily exposure to 5 kg of feed, we estimated that our patients were potentially exposed to over 150 g of gluten-containing dust particles per day, which they were inhaling and ingesting. It is impossible, however, to estimate exact exposure, and factors such as degree of ventilation and barn size may also have had an influence.

The evidence regarding a safe minimum amount of gluten for patients with celiac disease is scanty. In one study, 51% of patients with persistent symptoms had inadvertently ingested gluten from corn or rice cereals with malt-barley flavoring.³ Gluten can also be ingested inadvertently from tablets with wheat starch as a filler⁴ and from antacids with a wheat-flour base. Holy communion wafers have also been implicated.⁵

Our cases underscore the need for greater awareness of covert sources of gluten, both inhaled and ingested. Patients with celiac disease who have farming lifestyles may find total avoidance of gluten difficult. We found that with such patients, using face masks and limiting contact with animal feeds can markedly reduce symptoms and improve histologic abnormalities. The exposure of patients with celiac disease to gluten from

Table 1. Characteristics of the Two Patients with Nonresponsive Celiac Disease.

Variable	Patient 1	Patient 2
Symptoms		
At baseline	Fatigue, bloating, lower abdominal cramps	Abdominal cramps, daily diarrhea, fatigue, weight loss of 6 kg
With gluten-free diet and use of face mask	Resolution of symptoms	Resolution of symptoms
Results of serum antibody tests	Positive for endomysial antibodies; IgA tissue transglutaminase antibodies, 87.7 U/ml (normal range, 0–15)	IgA tissue transglutaminase antibodies, >199 U/ml (normal range, 0–15); α -gliadin antibodies, >293 U/ml (normal range, 0–15)
Marsh histologic type*		
At baseline	1–3	1–3
With gluten-free diet	1	3c
With gluten-free diet and use of face mask	0	3a

* The histologic changes that occur in celiac disease have been classified into five stages: Marsh type 0, preinfiltrative; type 1, infiltrative; type 2, hyperplastic; type 3, destructive (type 3a, partial villous atrophy; type 3c, total villous atrophy); and type 4, hypoplastic.

dry pet feeds may merit further investigation and quantification.

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