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Pure Oats and the Gluten-Free Diet: Are They Safe?

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Celiac disease is an autoimmune disease that is triggered in genetically susceptible individuals by the ingestion of gluten peptides found in wheat, rye, and barley. The only treatment for celiac disease is a challenging, life-long gluten-free diet. The diet is expensive and difficult because products made from gluten-containing grains are staples in the North American diet. The gluten-free diet can reduce the quality of life in both adults and children, which leads to reduced dietary adherence.[1] The gluten-free diet is often nutritionally deficient in vitamins, calcium, iron, and fiber.[2] Compared with other gluten-free grains, oats are easily incorporated into diets and provide an excellent source of nutrients.[3] Can people with celiac disease safely consume oats?

In this issue of the *Journal of Parenteral and Enteral Nutrition*, Sey et al[4] demonstrate the safety of pure and uncontaminated oats (350 g/wk) fed for 12 weeks to 15 adults with well-controlled celiac disease. Oat consumption did not increase symptom scores, biochemical analysis findings, or tissue transglutaminase antibody levels. The mild increase in severity of the histological score observed in 2 asymptomatic patients was believed to be attributable to sampling variability and declared gluten ingestion. This is the first study in adults to demonstrate the safety of pure oats grown and processed in North America. These commercially available oats adhere to manufacturing guidelines developed by the Canadian Celiac Association in consultation with Health Canada, Agriculture & Agri-Food Canada, and the Canadian Food Inspection Agency.[5] To produce pure and uncontaminated oats, the manufacturer grew and processed oats in a dedicated system that included fields, harvesting and production practices, storage, transportation, manufacturing equipment, and a production plant. The oat seed used is graded as Foundation #1, which is grown by Select Seed Growers. Foundation #1 seed permits the presence of 0–1 wheat, barley, rye, or triticale seed per kilogram of oat groats (approximately 30,000–40,000 groats/kg). The rolled oats or oat flour made into products from this seed contains ≤20 mg of gluten per kilogram of oat product.[5] Why is so much attention to detail required to produce oats that are safe for consumption by people with celiac disease?

Since the 1950s, experts have debated the safety of adding oats to the gluten-free diet. Most early studies demonstrated harm and recommended avoidance of oats.[6] In 1995, Finnish investigators published the first randomized trial comparing diets with and without oats in adults with celiac disease.[7] The investigators demonstrated that adding a moderate amount of oats (about 50 g/d) to a gluten-free diet allowed symptomatic and histological remission in adults newly diagnosed with celiac disease after 12 months and no deterioration after 6 months in patients with celiac disease in remission. The investigators attributed their success to 2 facts. First, glutens in wheat, rye, and barley make up 30%–50% of dietary protein. The glutens in oats avenin make up only 5%–15% of the total protein in the oat. Second, wheat, rye, and barley glutens contain peptides with high proline–glutamine content. These are resistant to digestion by human proteases and trigger small intestinal injury. Oat avenin contains less than half of these proline-glutamine peptides in modified forms compared with those found in an equivalent amount of wheat, rye, and barley. Janatuinen et al[7] postulated that oats were less antigenic than wheat, rye, or barley to individuals with celiac disease. Recently, investigators confirmed that oat immunogenicity for patients with celiac disease varies between the avenins of different varieties (cultivars) of oats.[8] Avenins of oat cultivars were all 40-fold to 400-fold less immunogenic than wheat gluten. Furthermore, some oat cultivars displayed no immunogenic response, and the use of these will likely permit the development of even safer pure oats.

At the time, the Finnish researchers did not consider a variable that contributed to their success. The oats used

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in the study were grown in fields and processed in a mill solely devoted to oats. In other words, the oats were likely not cross-contaminated with wheat, rye, or barley. The injury attributed to oats in celiac disease is, in most cases, likely due to wheat, rye, or barley contamination.[9] A recent study demonstrated that 68% of commercial oat samples from Europe, Canada, and the United States are contaminated with gluten-containing grains.[10] Oats produced for individuals with celiac disease must not be contaminated. The term *pure oats* was born at that time.

Since 1995, a number of European studies and 1 North American study have confirmed the safety of pure oat consumption by both adults and children diagnosed with celiac disease and dermatitis herpetiformis.[9] These studies evaluated the consumption of pure oats for varying durations, generally <1 year. In a follow-up study, adults who consumed pure oats for 5 years demonstrated no evidence of intestinal injury or immunological response suggestive of active celiac disease.[11] Children who consumed a gluten-free diet plus oats for 7 years displayed no clinical or serological evidence of relapse.[12]

Despite evidence supporting the safety of pure oats, individuals with celiac disease sometimes do not tolerate pure oats. Oat studies have been criticized for patient dropout rates of 6% for adults and 9% for children; these patients withdrew from the studies because of adverse side effects associated with oat consumption.[9] However, of the 170 adults and 89 children who participated in these studies, investigators report only 1 well-documented case of duodenal injury and dermatitis herpetiformis associated with pure oat exposure.[9,13] In vitro studies have demonstrated oat-specific reactivity in T-cell clones from patients with celiac disease.[14] Some patients report transient abdominal discomfort and bloating after beginning an oats challenge, likely caused by increased dietary fiber in those previously on a low-fiber diet.[9] Some patients may develop a food allergy to oats, similar to a cow's milk or soy allergy. Close follow-up should be performed for patients with celiac disease who add pure oats to a gluten-free diet. The long-term risks of the moderate use of oats are unknown. No guidelines have been established on how to monitor such a patient. Serial monitoring of clinical status and serology should be performed to assess intolerance of oats. Intestinal biopsy should be considered in those who develop persistent symptoms while on a diet containing oats.

For patients with celiac disease, the gluten-free diet is difficult to manage, is expensive, and must be followed for life. Gluten-free foods are often low in minerals, vitamins, and fiber.[2] Patients on the diet report difficulties finding high-quality, affordable gluten-free foods.[1] Pure oats provide a nutritionally rich food that we hope will become readily available. Many national celiac associations are endorsing the addition of a moderate amount of pure oats to the gluten-free diet.[3] This is defined as 50–70 g/d (1/2–3/4 cup dry rolled oats) for adults and 20–25 g/d (1/4 cup dry rolled oats) for children. To ensure consumer safety, international guidelines, such as those created by the Canadian Celiac Association, must be established for the production, distribution, and certification of pure oats and pure oat products. Consumers need to be educated about the differences between certified pure and uncontaminated pure oats and conventional oat products labeled *100% oats*, *pure oats*, or *organic oats*. Healthcare professionals need guidelines for the management of patients with celiac disease and dermatitis herpetiformis who choose to consume pure oats. Increased availability of pure oats will improve food choices and quality for those on a gluten-free diet.

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