

Coeliac Research Fund

Position Statement on:

The consumption of pure oats by individuals with coeliac disease

Background:

The toxicity of oats in coeliac disease is controversial and has led to differing recommendations as to its suitability as part of a gluten-free diet.

Coeliac disease (CD) is an inherited autoimmune condition triggered in genetically susceptible individuals by peptide sequences within the prolamines of ingested wheat (gliadins), barley (hordeins) and rye (secalins)⁽¹⁾ and in some people, oats (avenin). Some studies have shown gluten contamination in oat products⁽²⁻³⁾. In people with coeliac disease, ingestion of toxic prolamines induces a pathogenic T-cell response that leads to small bowel damage (villous atrophy).

Compared with the prolamines of wheat (40-50%), rye (30-50%) and barley (35-45%), oats contain a much smaller proportion (10-15%) therefore contains fewer potentially toxic proline residues⁽⁴⁾. Recent evidence confirms oats (avenin) contain a peptide sequence that induces an immunological response in some people with CD⁽⁵⁻⁷⁾. For example, one study determined that oat ingestion induces avenin-specific T cells in ~20% of people with coeliac disease. Twenty-three subjects with coeliac disease consumed oats (100 g/d). When screened against a comprehensive avenin peptide library, blood T-cell responses were found to a series of avenin peptides in five (22%) subjects. Immunostimulatory avenin peptides were typically rich in glutamine and proline and were similar to but not identical to wheat gluten epitopes⁽⁷⁾. This observation provides some evidence as to oat toxicity in some coeliac individuals.

In contrast, randomised controlled trials⁽⁸⁻¹¹⁾ performed in both adults and children with intakes of up to 70 g oats per day suggest that oats have no impact on the duodenal histology or serum antibody levels of patients with CD. Other uncontrolled, observational studies showing oats safety have been summarised in a recent review⁽¹²⁾. Results from these studies are noteworthy, and suggest that oats can be tolerated by many with coeliac disease. However, important points to consider in critiquing these studies include the fact that patient study sample sizes were small, and may have missed the "rare" individuals who do react to pure oats because they may have been unwilling to volunteer for these studies. The oats used were pure, free from other gluten-containing grain contamination, and the amount allowed per day was limited. Also, high withdrawal rate (11/102) from the largest study⁽⁸⁾ may have been due to adverse reactions. IgA-tissue transglutaminase or IgA-endomysial antibodies are not sufficiently sensitive for detecting "mild" dietary indiscretions, especially over a short period of challenge, i.e., less than 100 mg to 1000 mg of gluten per day⁽¹³⁾. Additionally, antibody-based blood tests are untested and may well be unreliable markers of intestinal damage when oats are the injurious grain.

The availability of oats would increase food choices for those on a gluten free diet (GFD). This may support an argument suggesting greater compliance to the strict life-long requirements of a GFD. There have been no formal studies performed to show the level of satisfaction of the availability and accessibility of gluten free foods in the Australian market. Therefore, it remains unknown as to whether the Australian coeliac population feels food options are limited due to the current exclusion of oats in the Australian GFD. Of note was

the finding that compliance to the GFD was not compromised in a recent local study of 57 patients whose dietary intakes were monitored over a 12 month period, where 100% of patients were confirmed to have strict adherence⁽¹⁴⁾.

Oats may improve the nutritional value of the gluten free diet. Oats are recognised for their low glycaemic index(GI)⁽¹⁵⁾ an attribute of foods which is considered beneficial in the dietary management of diabetes, although clinical observation suggests that satisfactory glycaemic control can be obtained in patients managing the combination of diabetes and coeliac disease in a gluten free diet excluding oats. Oats, like all grains are a significant source of B vitamins, minerals and fibre⁽⁴⁾. However a recent study comparing dietary intake of individuals' usual pre-diagnosis gluten-containing diet vs oat-free "no detectable gluten free diet"⁽¹⁶⁾ (as consumed at 12 months) showed that with the exception of thiamin, there was no statistically significant difference in the micro-nutritional and fibre⁽¹⁴⁾ intakes. Presently, in Australia, thiamin fortification is permitted in wheat-bread making flour⁽¹⁷⁾ not specifically oat products, so the decline in intake would not be especially enhanced by inclusion of oats.

In Australia, 'gluten free' food is defined by Food Standards Australia and New Zealand (FSANZ) in Joint Australian and New Zealand Food Standards Code Standard 1.2.8, Division 3, Paragraph 16. It specifies a gluten free food as a food having no detectable gluten using the universally accepted most sensitive and specific testing method and must also not contain oats or malt⁽¹⁸⁾. As Australia's Food Standard Code currently states that a product cannot be labelled GF if the product contains oats, oats continue to be excluded from foods labelled as gluten free in Australia⁽¹⁶⁾.

Statement:

The safety of oats in individuals with coeliac disease has been extensively investigated. Some people with coeliac disease exhibit toxicity to oats. The Clinical Advisory Committee of the Coeliac Research Fund recommends that in Australia and New Zealand, oats should be excluded from a gluten free diet for people with coeliac disease.

Note: The benefit of oats ingestion may outweigh the potential risks in specific circumstances, such as:

- **Medical indications**, such as a patient with poorly controlled type 1 diabetes and CD, where the low GI aspect of oats may be beneficial in stabilising blood sugar levels;
- **Individual preferences**, where the exclusion of oats has a major impact upon the individual's enjoyment of food.

The decision to allow oats as part of the gluten free diet should be made *in conjunction with a medical practitioner and dietitian experienced in the management of coeliac disease*, since absence of symptoms and normal coeliac serology are not reliable guides to intestinal injury occurring in association with oats ingestion - histological evidence of continuing normal intestine is needed to show oats are safe in any individual.

The recommended course of action in such a situation is:

- Adequate information should be provided that, in some people with coeliac disease, oats ingestion can be toxic and potentially harmful.
- Duodenal histology should be confirmed to be normal (Marsh 0 or 1) prior to any challenge with oats.
 - A dietary challenge comprises 50 g (approximately equal to 1/3 cup) per day of oats that are verified 'wheat contamination-free' are consumed for at least three months
- Symptoms and general health should be monitored over that time. If gut and/or other symptoms associated with the individual's coeliac disease are induced, the challenge has failed and oats should be excluded from future diets. If no symptoms are experienced, duodenal biopsies should be performed at the end of the challenge to assess for evidence of intestinal injury. Normal histology (Marsh 0) would indicate that oats are safe in that individual.
- Since commercial oats products are susceptible to wheat, barley, or rye contamination, only oats that are verified 'wheat contamination-free' should ever be consumed.

The toxicity of oats in childhood coeliac disease is unclear. There have been many anecdotal reports of their continuing use without apparent untoward effects in children on an otherwise gluten-free diet, but only one reported prospective study (10). This study suggested that inclusion of (contamination-free) oats in the standard GFD resulted in comparable clinical and histological outcomes at 12 months. Until further information is available, the recommendation is to omit oats from the standard gluten-free diet. However, if, after appropriate informed discussion between families and specialist practitioners a decision is made to include oats, the child must be closely followed up by regular clinical, serological and biopsy assessment..

- (1) Dickey W (2008) *Making oats safer for patients with coeliac disease*. Eur J Gastroenterol Hepatol, 20:494–495
- (2) Lundin KEA, Nilsen EM, Scott HG, Loberg EM, Gjoen A, Bratlie J, et al. (2003) *Oats induced villous atrophy in coeliac disease*. Gut. 52:1649-52.
- (3) Thompson T (2004) *Gluten contamination of commercial oat products in the United States*. N Engl J Med 351:2021-2.
- (4) Butt M, et al (2008) *Oat: unique among the cereals* Eur J Nutr 47:68-79.
- (5) Arentz-Hansen H, Fleckenstein B, Molberg O, Scott H, Koning F, Jung G, et al (2004) *The molecular basis for oat intolerance in patients with celiac disease*. Public Library of Science Medicine. 2004;1:e1.
- (6) Vader LW, Stepniak DT, Bunnik EM, Kooy YM, de Haan W, Drijfhout JW, Van Veelen PA, Koning F (2003). *Characterization of cereal toxicity for celiac disease patients based on protein homology in grains*. Gastroenterology. 125:1105-13
- (7) Tye Din JA, Beissbarth T, Anderson RP (2004). *Peripheral blood T cells induced by oat challenge target a series of avenin peptides in coeliac disease*. J Gastroenterol Hepatol. 19 Supplement:A212,
- (8) Janatuinen EK, Pikkarainen PH, Kempainen TA, Kosma VM, Jarvinen RM, Uusitupa MI, et al (1995). *A comparison of diets with and without oats in adults with celiac disease*. N Engl J Med 333:1033–1037.
- (9) Janatuinen EK, Kempainen TA, Julkunen RJK, Kosma VM, Maki M, Heikkinen M, Uusitupa MI (2002). *No harm from five-year ingestion of oats in coeliac disease*. Gut; 50:332–335.
- (10) Hogberg L, Laurin P, Falth-Magnusson K, Grant C, Grodzinsky E, Jansson G, et al (2004). *Oats to children with newly diagnosed coeliac disease: a randomised double blind study*. Gut 53:649–654.
- (11) Holm K, Maki M, Vuolteenaho N, Mustalahti K, Ashorn M, Ruuska T, Kaukinen K (2006). *Oats in the treatment of childhood coeliac disease: a 2-year controlled trial and a long-term clinical follow-up study*. Aliment Pharmacol Ther 23:1463–1472.
- (12) Garsed K, Scott BB (2007). *Can oats be taken in a gluten-free diet? A systematic review*. Scand J Gastroenterol 42:171–178.
- (13) Rashid M, Butzner D, Burrows V et al (2007) *Consumption of pure oats by individuals with celiac disease: A position statement by the Canadian Celiac Association*, Can J Gastroenterol 21(10)649-651.
- (14) Shepherd SJ (2008) *The role of diet in gastrointestinal disease: gluten in coeliac disease and FODMAPs in IBS* PhD thesis, Monash University, Victoria Australia
- (15) Granfeldt Y, Hagander B, Bjorck I (1995). *Metabolic responses to starch in oat and wheat products. On the importance of food structure, incomplete gelatinization or presence of viscous dietary fibre*. Eur J Clin Nutr 49:189–199.

(16) Shepherd S, Gibson PR (2006). *Understanding the gluten free diet for teaching in Australia*. *Nutr Dietet.* 63:155–65

(17) Food Standards Australia and New Zealand (FSANZ) (2008). *Fortification of food with vitamins and minerals*. Available from: www.foodstandards.gov.au/foodmatters/fortification

(18) Food Standards Australia and Zealand (FSANZ) (2007) *Joint Australian and New Zealand Food Standards Code Standard 1.2.8, Division 3, Paragraph 16*; Available from: http://www.foodstandards.gov.au/foodstandardscode/index.cfm#_FSCchapter1