

EDITORIAL

GLUTEN-FREE DIET: DEFINITION AND APPLICATIONS

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The treatment for celiac disease is a gluten-free (GF) diet for life.¹ This means strict avoidance of foods and beverages that contain wheat, rye, barley and triticale (a cross between wheat and rye). A GF diet is also required for management of other disorders of gluten intolerance including dermatitis herpetiformis and non-celiac gluten sensitivity. Gluten is a generic term applied to proteins in wheat (*gliadin*), barley (*hordein*) and rye (*secalin*). Patients with poorly treated celiac disease are at risk of several complications including nutritional deficiencies (e.g., osteoporosis), development of other autoimmune disorders and malignancies such as intestinal lymphoma.

A GF diet is complex, both for understanding and its application in everyday living. Wheat is not only ubiquitous in our diet, wheat flour (*atta*) is the most abundant and affordable staple food. Flours derived from naturally gluten-free grains like rice, corn, sorghum and millet provide good alternates but these grains are more expensive and cross contamination with wheat during milling process is almost universal. A GF diet is significantly more expensive as patients often have to rely on packaged food and is also socially restrictive especially for eating out and travelling. Because of these complexities, it is essential that patients requiring a GF diet consult a registered dietician skilled in this area.² Such dietetic services are not always readily available. In countries like Pakistan where awareness of GF diet and regulation for food labelling is limited, patients face far greater challenges.

Ideally, a GF diet should have zero gluten. However, the reality is that there is some background contamination with gluten-containing grains in many food products. There is limited research investigating the threshold of gluten acceptability in a GF diet. An elegant study by Catassi *et al* demonstrated that as little as 50 mg of gluten if ingested daily for a few months can lead to villous injury.³ This is a very tiny quantity and amounts to about 1/70th of a slice of toast. The safety threshold of gluten ingestion will also depend on the total amount of food consumed per day. Such research studies are difficult to perform as they require repeated invasive procedures (small intestinal biopsies) to look for early villous changes.

In the past, there had been controversy about the definition of GF diet. In Europe, gluten content of up to 200 ppm was acceptable in a GF diet whereas in North America the limit was set at 20 ppm. (Parts per million is equivalent to milligrams per kilogram, i.e., 20

ppm implies 20 mg of gluten per Kg of food). Furthermore, wheat starch was permissible in a GF diet in Europe but not in North America. A consensus on an international definition of GF diet has been reached only recently. Codex Alimentarius Commission is an international body of the Food and Agriculture Organization of the United Nations (FAO UN) and the World Health Organization (WHO) responsible for setting standards for regulating foods allergens. In July 2008, the Codex Committee on Nutrition and Foods for Special Dietary Uses revised its standard for foods to be considered 'gluten-free' for international trade. The highlights of this Standard include the following:

1. Gluten-free foods do not contain wheat, rye, barley, oats or their crossbred varieties and the gluten level does not exceed 20 ppm (20 mg/Kg) in total, based on the food as sold to the consumer.
- and/or
2. Gluten-free foods may contain one or more ingredients from wheat, rye, barley, oats or their crossbred varieties which have been specially processed to remove gluten and the gluten level does not exceed 20 ppm (20 mg/Kg) in total, based on the food as sold to the consumer.
3. The allowance of pure, uncontaminated oats may be determined at the national level.
4. Foods specially processed to reduce gluten content to a level between 20–100 ppm (20–100 mg/Kg) based on the food as sold or distributed to the consumer **must not** be labelled gluten-free. Labelling terms for such products (e.g., low gluten, reduced gluten) and decisions for marketing may be determined at the national level, but must indicate the true nature of the food.

Pure and uncontaminated oats in limited quantities are safe for consumption by most patients with celiac disease.⁵ However, because of frequent contamination of the commercially available oats with gluten-containing grains, they are included in the above definition of GF diet. This standardised definition of gluten-free is now being applied internationally and will create uniformity for trade.

Understanding the definition of GF diet is important not only for patients and health care professionals but also for food manufacturers and government agencies regulating food safety. It is the food manufacturer's responsibility to ensure that the gluten content of the product labelled gluten-free does not exceed the allowed limit of 20 ppm. Gluten in wheat

is a mixture of gliadin and glutenin proteins, each composed of several sub-fractions. Gluten analysis is, therefore, a complex procedure and not routinely available. The currently recommended test for gluten quantification is the R5 ELISA and few laboratories are equipped to perform the analysis accurately.

A food manufacturer in Pakistan has recently been selling whole wheat flour (*atta*) by marketing it as 'gluten-free'. Gluten in wheat is what gives its flour the binding capacity and currently there is no technology available to remove all gluten from wheat and still maintain its characteristic as flour. The manufacturer's claim in this case is clearly misleading and will jeopardise the health of patients on GF diet. Due to a lack of good understanding of a GF diet, it is easy for patients (and physicians) to succumb to such claims. In addition, because of poor health safety regulations, the government authorities have not taken any measures to address this serious problem.

In summary, patients, health care professionals, food industry and government regulatory

agencies all need to learn about GF diet. Patients must be vigilant about label reading. Any claims of a product being gluten-free should be critically evaluated with appropriate testing. The government should enact strict food labelling legislation and scrutinise any manufacturer claiming to make GF products to ensure the health of patients on a GF diet.

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