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COELIAC DISEASE AND THE GLUTEN-FREE DIET

Coeliac disease is a genetically mediated autoimmune disease that affects 1% of the population worldwide. The only treatment for coeliac disease is lifelong adherence to a strict gluten-free diet (GFD). Despite the current interest in the gluten-free diet, coeliac disease remains under-diagnosed and the diet is often misrepresented.

Historically, coeliac disease was thought to be a rare childhood illness that the affected individuals would eventually outgrow. Today we know that coeliac disease can be diagnosed at any time along the lifespan and, once triggered, the condition requires lifetime adherence to the GFD. As yet, researchers have not uncovered the mechanism to block or reverse the condition once it is activated.

THE REAL NUTRITIONAL STATUS OF THE GFD

Popular media beliefs attribute weight loss, improved athletic ability and increased overall health amongst many other health claims to a gluten-free diet. While the pillars of a GFD are indeed fruits, vegetable, protein and dairy products, it is in the carbohydrate selections that the diet often falls short of its potential.

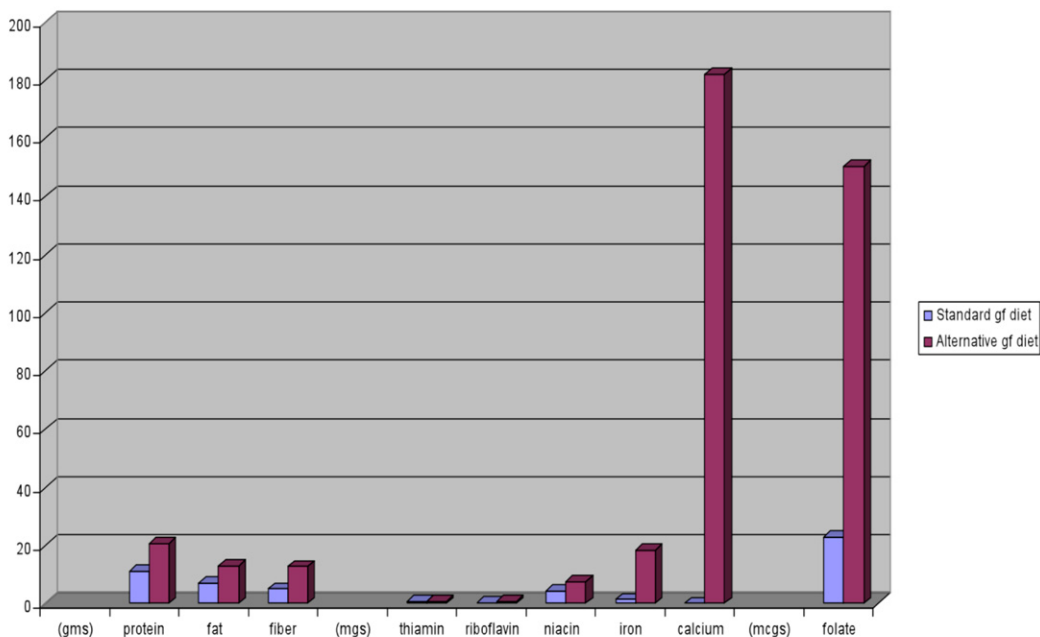
The traditional GFD has been reported in several studies to be less nutritious than the current media beliefs.^{1,2,3} In the study by Dickey,³ it was found that long-term GFD adherence was associated with an average weight gain in over 80% of diet adherent patients. In the study by Hallert,² in addition to the weight gain, 37% of the participants also showed signs of malnutrition with elevated homocysteine levels despite endoscopic results indicating a healed small intestine. A subsequent study,⁴

revisited the nutritional deficiencies of long-term GFD adherent coeliac patients and found similar results to Hallert and colleagues.² In comparing the intake of the participants on a GFD to the general population controls, Hallert² found that the number of bread servings was the same in both groups, however, the nutritional content of the gluten-free bread was inferior to its wheat-based counterpart.

In another study of usual intake patterns, Thompson and colleagues¹ reviewed the food records of 34 participants, which revealed deficiencies in B vitamins, fibre, calcium and iron in the standard GFD. In the study,¹ females did not meet any of the recommended dietary standards and males only met the recommendation for iron. In a subsequent study by Lee and colleagues,⁵ the impact of adding the ancient grains to the standard gluten-free dietary pattern was measured. The results were a statistically significant change in the nutrient profile. The nutrient profile was transformed from not meeting the dietary recommendations, as Thompson and Hallert had found, to meeting the recommendations for both men and women. The addition of only two servings of alternative grains (1/2 cup each oats and quinoa) and a serving of high fibre gluten-free bread and a biscuit changed the nutrient content two fold.



Figure 1: Nutrient comparison of standard vs alternate diet



Of great concern, as revealed in the studies by Lee⁵ and Thompson¹, the typical intake of participants with coeliac disease relied heavily on prepared foods, quick and convenience products. Gluten-free doughnuts and white rice were often the most frequently consumed carbohydrates. Gluten-free alternative grains, wholegrain based products and enriched products were seldom included in the typical intakes of the study participants. At the time of the studies, few enriched or wholegrain prepared products were readily available in the market place; however, alternative grains have been readily available for many years.

BRIGHTER FUTURE FOR GLUTEN-FREE PRODUCTS

Thankfully, manufacturers are responding to the research and changing the nutrient profile of many of the gluten-free products. Gluten-free breads can now be found containing wholemeal brown rice instead of starches and ancient grains such as millet, buckwheat, and quinoa. Some products are now even enriched with vitamins and minerals. Pastas can now be found to be made of quinoa, black bean and red

lentil, providing excellent sources of protein, B vitamins and fibre. However, availability of nutrient rich products alone does not guarantee a nutritionally balanced intake.

Careful review of clients' usual dietary pattern is needed to identify deficiencies and encourage inclusion of higher nutrient dense gluten-free products and foods. Current practice guidelines by National Institute of Clinical Excellence (NICE),⁶ the British Society of Gastroenterology,⁷ as well as the European Society of Paediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN)⁸ and the Academy of Nutrition and Dietetics (AND),⁹ encourage the inclusion of gluten-free wholegrains, ancient grains and oats in the gluten-free diet to bridge the nutrient gap.

Adding the alternative grains into the gluten-free diet may not provide just a nutritional answer, but may also be an economic solution for many patients as well. Typically, the alternative grains are less expensive than many gluten-free products. In the study in the UK by Burden and colleagues,¹⁰ it was found that regular and quality supermarkets carried the greatest range of gluten-free products. However, they were

Table 1: Nutritional breakdown of gluten-free grains

Nutrient Per 100gms	White rice	Brown rice	Quinoa	Buckwheat	Millet	Oats	DV 2000 calorie diet
Calories	97	112	120	92	119	371	2000
Protein g	2.02	2.32	4.4	3.38	3.51	13.7	
Fat g	0.19	0.83	1.92	0.62	1.0	6.87	65
Fibre g	1.0	1.8	2.8	2.7	1.3	9.4	25
Thiamin mg	0.02	0.102	0.107	0.04	0.106	0.54	1.5
Riboflavin mg	0.013	0.012	0.110	0.039	0.082	0.123	1.7
Niacin mg	0.29	1.33	0.412	0.94	1.33	0.823	20
Iron mg	0.14	0.53	1.49	70.9	0.63	49.5	18
Calcium mg	2	10	17	7	3	47	1000

typically four times more expensive than their wheat-based counterparts. It was also noted that budget stores did not carry any gluten-free products. Similar findings were reported from the United States by Lee and colleagues¹¹ and in Canada.¹² In the Canadian study,⁸ gluten-free products were on average 242% more expensive.

Issues of availability were found in the US¹¹ similar to the findings for the UK. In Lee’s study¹¹ only 36% of the gluten-free items were carried in regular supermarkets, whilst 100% of the products were available online. Lee also found that the online products were the most expensive in comparison.¹¹ In the United States where gluten-free products are not on prescription, breads were found to be 153% more expensive, whilst biscuits and cakes were 278% more expensive. Using the alternative grains would provide a nutritious cost effective alternative.

The second concern revolves around the potential for cross contact with gluten. While the potential for contact of gluten in oats has been researched over the year, little attention has been given to the same risk in other grains. The study by Thompson and colleagues¹³ revealed the reality of the concerns of gluten exposure of these ancient grains. In the study it was found that some grains not labelled gluten-free contained as much as 300ppm gluten, almost 60 times the acceptable level.¹³ The authors concluded that only certified gluten-free grains should be

included in the GFD. Thompson has continued to test and report on the gluten content of grains and processed gluten-free products on the site www.glutenfreewatchdog.com.

CONCLUSION AND PRACTICE POINTS

Adding alternative grains to the gluten-free diet not only provides a nutritional advantage for your patients, but potentially is a cost effective one as well. These grains may be new and unfamiliar to your patients. Providing a weekly menu, cooking instructions, traditional recipes familiar to your clients, with the addition of the grains, may improve acceptance. However, care must be taken to add the grains slowly and ensure that the grains be labelled gluten-free to avoid any risk of cross contact with gluten.

While the addition of these powerhouse grains appears to be an ideal solution, in practice some caution must be advised. As the ancient grains offer good sources of fibre, a large amount of grains (and thus fibre) suddenly added to the typical GFD could cause some gastrointestinal distress mimicking gluten exposure. It is generally recommended to add the ancient grains slowly and over time, starting with a quarter to a half portion per day, then slowly increasing over time. In addition to the slow introduction of these grains, to monitor for tolerance and allow the gastrointestinal system to adjust, care must be given to recommend adequate intake of fluids.