

Role of Gluten-Free Functional Foods in the Management of Celiac Disease

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Celiac disease is a genetically-determined chronic inflammatory intestinal disorder that can occur in genetically predisposed people where the intake of gluten in diet leads to damage the lining of the small intestine. It is induced by a protein known as “gluten” present in cereals such as wheat, barley, rye etc. It disturbs nearly one per cent of people in the world and strict gluten-free diet for the whole life is the only available treatment. Gluten-free food products existing in the market today are more expensive than gluten-containing food products. Also, these are known to have lower nutritional value than the required needs of celiac patients and there is an urgent need to develop cheap, nutritionally rich gluten free food products for promotion of healthy life in people suffering from celiac disease [1].

It develops in genetically predisposed subjects as a consequence of abnormal response of body’s immune system to wheat gluten and related prolamines of barley and rye causing inflammation and injury to the lining of the small intestine resulting in decreased absorption of nutrients such as calcium, iron, folate and fat soluble vitamins A, D, E, K. The cereal protein, gluten, some genes and body’s immune system are the main factors responsible for causing celiac disease [2]. Major symptoms of this disease include diarrhoea, prolonged abdominal discomfort, growth obstruction in children, headache and chronic fatigue, dermatitis herpetiformis, reduced fertility, nerve and brain disorders, osteoporosis and risk of intestinal cancer. Various serological tests and bowel biopsy are major tools for clinical diagnosis of this disease [3]. The only available safe and effective treatment for this disease is to consume gluten-free foods throughout the whole life. Other alternative treatments include alteration of dietary constituents, inhibition of intestinal permeability, degradation of gluten with enzymes, and modulation of the immune response [4].

Major section of bakery products depends on gluten for their optimal structural characteristics. It is main protein present in wheat and provides structure to products such as bread, biscuits, cakes etc. by trapping carbon dioxide produced during fermentation and baking processes due to biological (yeast) and chemical (sodium bicarbonate, ammonium bicarbonate etc.) leavening agents added in these products. Therefore, it is very tedious task to prepare products from gluten free cereals with acceptable texture and mouth feel.

Most of gluten-free products prepared from cereals are using refined gluten-free flour or starch, so these products are rich sources of fat and carbohydrates only if not fortified with essential nutrients [5]. Lack of gluten in these products provides weak structure leading to mechanical and organoleptic challenges during preparation of these products [6]. A large number of starches, flours and other ingredients (proteins, hydrocolloids, enzymes) are used to develop viscoelastic properties similar to that of gluten, for development of good sensory and structural characteristics and improving the nutritional composition of gluten-free food products [7].

A gluten-free food product must be comparable with gluten-containing products with respect to nutritional composition. In gluten-free product, there should not be any ingredient that contains gluten, as intake of gluten or its protein fraction i.e. gliadin in wheat, secalins in rye, horedins in barley and avenins in oats can cause allergic reactions in people suffering from celiac disease [5]. Some of the gluten-free and nutritious grains includes cereals (corn, rice), pseudo-cereals (buckwheat, amaranth and quinoa), millets (pearl millet, finger millet, kodo millet, foxtail millet and pearl millet) and pulses (soyabean, pea, chickpea, Bengal gram etc.) which can be used for preparation of gluten free functional foods.

Besides, cereals and pulses, other gluten-free ingredients that can be used for developing food products for celiac patients include seeds (chia seeds, flax seeds, pumpkin seeds), nuts (hazelnuts, almonds, chestnut, walnut, cashew nut) and tubers (tapioca, arrowroot, taro, jicama, potato etc.) [8].

During development of products aiming celiac patients, It is very essential to follow the regulations and standards set by various national and international bodies. The Codex Standard for gluten-free foods was approved by the Codex Alimentarius Commission (CODEX) of the World Health Organization (WHO) and by the Food and Agricultural Organization (FAO) in 1976 [9,10].

It has been observed that adopting a gluten-free diet adds a lifelong economic burden to the patients, because the gluten-free products available in the market are much expensive as compared to the gluten containing products. Therefore, it is a crucial requirement to develop gluten free food products from cheap and nutritious sources which are available in plenty so as to make these products accessible at affordable prices.

Bibliography

1. Jnawali P, *et al.* "Celiac disease: Overview and considerations for development of gluten-free foods". *Food Science and Human Wellness* 5.4 (2016): 169-176.
2. Churrua I, *et al.* "Analysis of body composition and food habits of Spanish celiac women". *Nutrients* 7.7 (2015): 5515-5531.
3. Hybenová E., *et al.* "Celiac disease and gluten-free diet". *Potravinárstvo Slovak Journal of Food Sciences* 7.1 (2013): 95-100.
4. Tack GJ., *et al.* "The spectrum of celiac disease: epidemiology, clinical aspects and treatment". *Nature Reviews Gastroenterology and Hepatology* 7.4 (2010): 204-213.
5. Moreno Amador MdL., *et al.* "Alternative grains as potential raw material for gluten-free food development in the diet of celiac and gluten-sensitive patients". *Austin Journal of Nutrition and Metabolism* 2.3 (2014): 1016.
6. Matos M and C Rosell. "Understanding gluten-free bread development for reaching quality and nutritional balance". *Journal of the Science of Food and Agriculture* 95.4 (2015): 653-661.
7. Marco C and CM Rosell. "Breadmaking performance of protein enriched, gluten-free breads". *European Food Research and Technology* 227.4 (2008): 1205-1213.
8. Green PH and C Cellier. "Celiac disease". *New England Journal of Medicine* 357.17 (2007): 1731-1743.
9. Arendt EK and MM Moore. "Gluten-free cereal-based products". *Bakery products: science and technology* (2006): 471-496.
10. Saturni L., *et al.* "The gluten-free diet: safety and nutritional quality". *Nutrients* 2.1 (2010): 16-34.

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