

To assess the nutritional status and dietary pattern of celiac disease patients

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ABSTRACT

Celiac disease also known as gluten sensitive enteropathy, is a permanent intolerance to gluten, which causes damage to the small bowel mucosa by an autoimmune mechanism in genetically susceptible individuals. Nutritional status and dietary pattern of celiac patients are the most important factors to be kept in consideration for their healthy living. The present study was undertaken with the objectives of studying the nutritional status and dietary pattern of celiac disease patients. The study included 130 respondents visiting PGI. The present study revealed that prevalence of celiac disease was found to be more in females (60%) than in males (40%) and maximum number of respondents were found in 19-49 age group *i.e.* (57.7%). It was observed that nutritional deficiency such as iron (24.6%), calcium (10.8%), vitamin A, and vitamin D (4.7%) occurred in celiac patients. So they have to include nutritional supplement in their diet. The average daily intake of calories and protein was below RDA. The calcium intake among the patients was also below the recommended dietary allowances, the intake of folic acid was found to be approximately equal or above the RDA. Majority consulted the dietician for a proper diet but nearly 73% of the respondents followed the prescribed diet (gluten free diet). Nutrition deficiencies mainly of iron and calcium were also present in the respondents. Majority of respondents reported poor dietary intake thus affecting their nutritional status.

Key Words : Celiac, Dietary pattern, Enteropathy, Gluten, Nutritional status

INTRODUCTION

Celiac disease is also known as gluten sensitive enteropathy, is a permanent intolerance to gluten, which causes damage to the small bowel mucosa by an autoimmune mechanism in genetically susceptible individuals. It is a chronic disorder caused by the inflammation of T-cell response to the storage proteins in wheat (gliadin), rye (secalin), and barley (hordein), which are collectively called “gluten” and characterized by the presence of typical auto antibodies and histological alterations of the small bowel mucosa. Ingestion of gluten by genetically predisposed people precipitates an uncontrolled T-cell-driven inflammatory response that leads to disruption of the structural and functional integrity of the small bowel mucosa (Rashid *et al.*, 2005).

Gluten is a general term used to describe a mixture

of storage proteins, including prolamins, hordeins and secalins found in wheat, barley and rye. Environmental factors such as gluten introduction at childhood, infectious agents and socioeconomic features, as well as the presence of HLA-DQ2 and HLA-DQ8 halotypes or genetic variations in several non-HLA genes contribute to the development of celiac disease. Approximately 95% of celiac disease patients express HLA-DQ2, and the remaining patients are usually HLA-DQ8 positive (Mameli *et al.*, 2013).

Types of celiac disease :

Classical celiac disease: Patients have signs and symptoms of malabsorption, including diarrhea, steatorrhea (pale, foul smelling, fatty stools), and weight loss or growth failure in children.

Non-classical celiac disease:

Patients may have mild gastrointestinal symptoms without clear signs of malabsorption or may have seemingly unrelated symptoms. They may suffer from abdominal distension and pain or other symptoms such as chronic deficiency anemia, chronic fatigue, chronic migraine, peripheral neuropathy, reduced bone mass and bone fractures and vitamin deficiency (folic acid and vitamin B12), early menopause, unexplained infertility and dental enamel defects.

Silent celiac disease:

It is also known as asymptomatic celiac disease. Patients do not complain any symptoms, but still experience villous atrophy damage to their small intestine.

Nutritional deficiencies :***Vitamins and minerals :***

Vitamin and mineral deficiencies characterize classical celiac disease. Deficiencies of water soluble vitamins, like B-vitamins, would be expected since they are absorbed in the proximal small bowel, which is the most prominent site affected in celiac disease patients (Wierdsma and Van, 2013).

Calcium :

This deficiency is common in active celiac disease because of decreased intestinal absorption and because this mineral bind with malabsorbed fat which passes through the system. Supplemental calcium must be recommended to compensate the losses that occur during disease (Rodrigo, 2006).

Magnesium :

Osteoporosis and magnesium deficiency occurs in celiac disease patients. Magnesium deficiency is known to impair parathyroid hormone (PTH) secretion and action in humans and will result in osteopenia and increased skeletal fragility in animal models. It is particularly important for doctors to assess the magnesium status of celiac, because without correction of magnesium deficiency, low levels of calcium and potassium in the blood cannot usually be corrected with supplements (Olerich and Rude, 1996).

Iron :

Iron deficiency anemia has been reported as the most frequent extraintestinal symptom in adult celiac

disease. Anemia is a very common symptom of celiac disease. As the body uses hemoglobin- a protein found in the red blood cells- to carry oxygen throughout the body. When persons have anemia, they don't have enough hemoglobin and so their cells aren't getting enough oxygen to function well. Hence symptoms appear like shortness of breath, fatigue and dizziness (Ransford *et al.*, 2002).

Folic acid deficiency :

This is particularly common in celiac disease because, like iron, it is absorbed in the upper small intestine. Folic acid is necessary for DNA replication, which occurs in cell turnover. So a deficiency of folic acid can impair the regenerative ability of the small intestine (Kumar *et al.*, 2009).

Copper deficiency :

It is an uncommonly reported complication of celiac disease that has not received much attention in recent years. Copper deficiency may result in anemia and thrombocytopenia and also irreversible myeloneuropathy if it is not detected and treated appropriately (Kumar *et al.*, 2009).

METHODOLOGY

The present study was conducted in Postgraduate Institute of Medical Education and Research, Sector 12, Chandigarh.

The sample consists of 130 patients of all age group. It spanned from September 2017 to February 2018. SPSS version (23) was used for analysis of data. Further statistical analysis included mean, percentages, chi-square test and t-test.

RESULTS AND DISCUSSION

Table 1 showed that majority were non vegetarian 57.7% followed by 40.8% of the patients were vegetarian and remaining 1.5% of the patients were ova vegetarian

Table 2 revealed that nearly 82% of the patients take a well-balanced diet. But some of the patients omit some of the food groups from their diet. Such as 16.2 % of the patients omit pulses, 5.4% of the patients avoid sugar and .8% of the patients restrict cereals in their diet.

Table 3 revealed that 88.5% of the patients had regular meals while 11.5% of the patients skip their meals. It also reveals that 11.6% of the patients had two meals

per day, 80.8% of the patients had three meals per day, and 5.4% had four meals per day while 2.3% had around 5 meals per day.

Table 4 showed that majority of the study respondents 96.2% consulted dietitian out of which 72.3% followed prescribed diet.

Table 5 showed that 53.1% of the patients take

nutritional supplement. It depicted the kind of nutritional supplement taken up by the celiac disease patients. 33.1% of the patients take calcium as nutritional supplement, 18.5% take iron as nutritional supplement, and 1.5% takes vitamin A, vitamin D as nutritional supplement.

Table 6 showed that 59.9% of the patients do not suffer from any kind of deficiency. While 10.8% of the

Table 1 : Dietary habits				
Variable	Age category			Total
	< 18 Years	19-50 Years	>50 Years	
Vegetarian	16 (12.3)	28 (21.5)	9 (6.9)	53 (40.8)
Non-vegetarian	25 (19.2)	46 (35.4)	4 (3.1)	75 (57.7)
Ova-vegetarian	1 (0.8)	1 (0.8)	0 (0.0)	2 (1.5)
Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)

Table 2 : Taking balanced diet					
Category	Variable	Age category			Total
		< 18 Years	19-49 Years	>50 Years	
Well balanced diet	Yes	25 (19.2)	69 (53.1)	12 (9.2)	106 (81.5)
	No	17 (13.1)	6 (4.6)	1 (0.8)	24 (18.5)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)
Food groups omitted	No food group omitted	22 (16.9)	67 (51.5)	12 (9.2)	101 (77.7)
	Cereals	1 (0.8)	0 (0.0)	0 (0.0)	1 (0.8)
	Sugars	3 (2.3)	4 (3.1)	0 (0.0)	7 (5.4)
	Pulses	16 (12.3)	4 (3.1)	1 (0.8)	21 (16.2)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)

Table 3 : Consumption of meals in a day					
Category	Variable	Age category			Total
		< 18 Years	19-49 Years	>50 Years	
Number of meals in a day	2	5 (3.8)	7 (5.4)	3 (2.4)	15 (11.6)
	3	29 (22.3)	64 (49.2)	12 (9.2)	105 (80.8)
	4	6 (4.6)	1 (0.8)	0 (0.0)	7 (5.4)
	5	1 (0.8)	2 (1.5)	0 (0.0)	3 (2.3)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)
Skip meal	Yes	7 (5.4)	8 (6.2)	0 (0.0)	15 (11.5)
	No	35 (26.9)	67 (51.5)	13 (10.0)	115 (88.5)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)

Table 4 : Nutrition education					
Category	Variable	Age category			Total
		< 18 Years	19-49 Years	>50 Years	
Consult dietitian	Yes	40 (30.8)	73 (56.2)	12 (9.2)	125 (96.2)
	No	2 (1.5)	2 (1.5)	1 (0.8)	5 (3.8)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)
Prescribed diet	Yes	28 (21.5)	56 (43.1)	10 (7.7)	94 (72.3)
	No	14 (10.8)	19 (14.6)	3 (2.3)	36 (27.7)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)

patients suffer from calcium deficiency, 24.6% suffer from iron deficiency, and the remaining 4.7% suffer from other deficiencies such as magnesium, folic acid, etc.

Table 7 showed that 23.1% of the patients do not

consume meal outside the home. 12.3% of the patients had a meal outside the home once in a week, 20.8% of them had meal outside the home once in a month while 43.8% of the patients had meal once in 5-6 months outside

Table 5 : Nutritional supplement

Category	Variable	Age category			Total
		< 18 Years	19-49 Years	>50 Years	
Consumption of nutritional supplement	Yes	19 (14.6)	39 (30.0)	11 (8.5)	69 (53.1)
	No	23 (17.7)	36 (27.7)	2 (1.5)	61 (46.9)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)
Type of nutritional supplement	No nutritional supplement	23 (17.7)	36 (27.7)	2 (1.5)	61 (46.9)
	Calcium	12 (9.2)	25 (19.2)	6 (4.6)	43 (33.1)
	Vitamin A,D	0 (0.0)	1 (0.8)	1 (0.8)	2 (1.5)
	Iron	7 (5.4)	13 (10.0)	4 (3.1)	24 (18.5)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)

Table 6 : Nutritional deficiency

Category	Variable	Age category			Total
		< 18 Years	19-49 Years	>50 Years	
Type of deficiency	No deficiency	26 (19.9)	46 (35.4)	6 (4.6)	78 (59.9)
	Calcium	5 (3.8)	8 (6.2)	1 (0.8)	14 (10.8)
	Iron	6 (4.6)	20 (15.4)	6 (4.6)	32 (24.6)
	Other	5 (4.0)	1 (0.8)	0 (0.0)	6 (4.7)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)

Table 7 : Precautions followed and frequency of meals consumed outside

Category	Variable	Age category			Total
		< 18 Years	19-49 Years	>50 Years	
Frequency of meal	Not consuming	5 (3.8)	17 (13.1)	8 (6.2)	30 (23.1)
	Once a week	5(3.8)	10 (7.7)	1 (0.8)	16 (12.3)
	Once a month	10 (7.7)	17 (13.1)	0 (0.0)	27 (20.8)
	Other	22 (16.9)	31 (23.8)	4 (3.0)	57 (43.8)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)
Precautions	No precautions	8 (6.2)	15 (11.5)	7 (5.4)	30 (23.1)
	Avoid gluten	28 (21.5)	43 (33.1)	4 (3.1)	75 (57.7)
	On gluten free product	0 (0.0)	2 (1.5)	2 (1.5)	4 (3.1)
	Rice based product	6 (4.6)	15 (11.5)	0 (0.0)	21 (16.2)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)

Table 8 : Type and preparation of flour

Category	Variable	Age category			Total
		< 18 Years	19-49 Years	>50 Years	
Type of flour used	Corn flour	17 (13.1)	33 (25.4)	6 (4.6)	56 (43.1)
	Mix flour	10 (7.7)	13 (10.0)	4 (3.1)	27 (20.8)
	Both	15 (11.5)	29 (22.3)	3 (2.3)	47 (36.2)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)
Preparation of flour	Market	13 (10)	29 (22.3)	3 (2.34)	45 (34.6)
	Home made	29 (22.3)	46 (35.4)	10 (7.7)	85 (65.4)
	Total	42 (32.3)	75 (57.7)	13 (10.0)	130 (100)

the home. It also depicts about the precaution while eating outside the home either may be I restaurants or hotels such as, 57.7% of the patients avoid gluten products while eating outside, 3.1% of the patients take their own gluten free products with them, 16.2% eat rice based products.

Table 8 showed that 56% of the patients use corn flour in their homes for making chapattis, 27% of the patients uses mix flour (made up of maize flour, rice flour, chickpea flour, sorghum flour), the remaining 47% of the patients uses both flour (mix as well as corn flour). Majority of the respondents 65.4% uses homemade flour whereas 34.4% uses flour from the market.

Conclusion :

The present study was undertaken with a view to study the nutritional status and dietary pattern of celiac disease patients.

Majority of the patients were non-vegetarian while 1.5% were ova vegetarian. Almost all had regular meals but 11.5% of all were fussy eaters. Majority of the patients have a well-balanced diet but mostly in case of respondents of <18 years of age group (12.3%), they omit pulses from their food groups. Maximum number (96.2%) of the patients consult to dietitian but only 72.3% of the them were strictly following the gluten free diet. 7% of the patients have other food allergies with respect to gluten such as egg, peanuts etc. Nutritional deficiency such as iron 24.6%, calcium (10.8%), vitamin A, and vitamin D (4.7%) occurred in celiac patients. So nutritional supplements such as iron, calcium, vitamin A, vitamin D were included in their diet. 23.1% avoid

consuming meal outside home, and those who consume avoid gluten 57.7%, carry their own gluten free product 3.1%, or rice based product 16.2%. Majority of the respondents (43.1%) uses corn flour for preparation of chapattis and (20.8%) use mix flour (made up of rice, bajra, sorghum, maize, chickpea) and few of them (36.2%) uses both flours.

REFERENCES

- Kumar, N., Halfdanarson, T., Hogan, W. and Murray, J. (2009). Copper deficiency in celiac disease. *J. Clinical Gastroenterol.*, **43**(2): 162-164.
- Mameli, C., Dilillo, D., Meneghin, F., Fabiano, V. and Zuccotti, G.V. (2013). An approach to nutritionally adequate and balanced diet. *Nutrients J.*, **9**(11): 4553-4565.
- Olerich, M. and Rude, R.K. (1996). Magnesium Deficiency: possible role in osteoporosis associated with gluten-sensitive enteropathy. *Osteoporosis Internat.*, **6**(6): 453-461.
- Ransford, A.J.R., Hayes, M., Palmer, M. and Hall, M.J. (2002). Prospective screening study of celiac disease presenting as iron deficiency anemia. *J. Clinical Gastroenterol.*, **35**(3): 228-233.
- Rashid, M., Cranney, A., Zarkadas, M., Graham, D., Switzer, C., Molloy, M. and Burrows, V. (2005). Evaluation of the diagnosis and dietary compliance in children. *J. Pediatrics*, **116**(6): 754-759
- Wierdsma, N. and Van, M. (2013). Vitamin and Mineral deficiencies are highly prevalent innewly diagnosed celiac disease patients. *Nutrients J.*, **5**(10): 3975-3992.
