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Effect of Nutrition Interventions on Knowledge and Adoption Feasibility of Gluten Free Products by Celiac Disease Patients

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ABSTRACT

The study was undertaken with the objective to improve the nutritional knowledge and technical skill of celiac disease patients. Since celiac is a disease which occurs due to gluten allergy and quite prevalent these days. Hence this study was planned to promote nutrition education to celiac patients and give them training on preparation of gluten free products during 2020-21. Thirty celiac disease patients were selected randomly using snowball method. Lectures cum demonstrations for preparation of gluten free quinoa based *laddoo,* upma, porridg*e* and *pulao* were given. Leaflets containing the recipes for preparation and nutritional importance of quinoa products were distributed. Pre exposure scores (1.00 to 1.55) depicted that respondents had very less knowledge of celiac disease, its causes, gluten free foods, quinoa and its products, price of quinoa, nutritional importance and medicinal uses of quinoa seeds. A significant increase (P<0.01) was observed in knowledge scores (1.71 to 2.00) of respondents after imparting nutrition education. All the quinoa products i.e. *laddoo,* porridge, *pulao* and upma were liked by them and they felt that they can easily make these products.

INTRODUCTION

Quinoa (*Chenopodium quinoa*) is a pseudocereal and can be explored in innovative food processing industry for development of highly nutritious functional foods. Quinoa due to its phytochemical and bioactive compound profile is known to be a potent antioxidant which can modulate the immune competency and metabolic processes involved in inflammation and can also serve to improve the gut health (Ng & Wang, 2021). It has been emphasised that the regular consumption of processed quinoa have hypolipidemic and hypoglycemic properties owing to unique resistant starch and dietary fibre contents and is very promising for human nutrition (FAO, 2011). What makes quinoa a unique potent source is its essential amino acids composition. Like pearl millet, quinoa is also being termed as climate smart crop as it can withstand the harsh climatic conditions (Angeli et al., 2020). In this scenario of worldwide hunger, hidden hunger and climate concerns it is advisable to promote the utilization of quinoa in different food formulations (Singh, 2018; Mohammad et al., 2017). It has been observed that there is very little awareness among masses on importance and nutritional quality of quinoa and technology for its production and utilization (Alandia et al., 2020; Puri et al., 2020). The development of composite bar using low cost, locally available ingredients were nutri dense and a convenient snack for children and adults (Kumari et al., 2021)**.** Replacement of wheat flour with pearl millet flour and chick pea flour increased the protein, fibers and iron contents proportionately to the level of substitution (Singh et al., 2020). There is need to promote utilization of quinoa and its products through government-sponsored mid-day meal programmes and public distribution system so that venerable section of society can get nutritionally superior quinoa in their daily diet (Praveen et al., 2021). It will be good for such people also who do not prefer

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animal products and alternative uses of quinoa will give them high quality protein food. Lots of efforts are required to increase the utilization of quinoa at household and industrial level. Most important quality of quinoa is that it is gluten free and can be utilized for making food products for celiac patients.

There are a huge number of celiac disease patients in India and only a small part of them get diagnosed (Rajpoot & Makharia, 2013). It has been emphasised that management of patients with celiac disease by proper nutrition counselling, diet and care is an important aspect. The industrial production of reliable and affordable gluten free products and food labelling for gluten content is imperative for consumer information and awareness. Studies have reported that the nutrition education considerably improved the knowledge of celiac patients regarding causes, diagnosis and treatment and concluded that nutritional education increased the understanding of celiac disease among its patients, which could help to improve their health Barzegar et al., (2017). There is urgent need to increase awareness about the celiac disease and popularize the use of gluten free diet as a lifelong measure for celiac patients Malik et al., (2019). Keeping this mind it was planned to standardise and popularise gluten free products and also provide knowledge to patients to improve their life.

METHODOLOGY

The current research was carried out in Hisar district, Haryana state during 2020-21. Thirty respondents were selected randomly by using snowball method. Lectures cum demonstration for preparation of gluten free quinoa *laddoo,* upma, *porridge* and *pulao* were given. Leaflets containing the recipes for preparation and nutritional importance of quinoa products were distributed. Nutrition education was imparted to all the respondents for three months at 15 days intervals. After three months of the nutrition education programme, they were assessed for perceived feasibility for the preparation of demonstrated products. The difference in gain in knowledge and perceived feasibility in respect of ease of making gluten free products of 30 respondents were assessed at pre and post-exposure stage. Mean scores and paired t test were applied as the statistical tools.

RESULTS AND DISCUSSION

The data presented in Table 1 and 2 indicated the impact of nutrition education on knowledge gain of celiac disease patients and perceived feasibility in respect of ease of making gluten free products. Analysis of a total of 27 statements was carried out to

Table 1. Gain in knowledge score of celiac disease patients

S. No.	Knowledge	Pre scores	Post scores	Gain in knowledge	t-value
1	Wheat allergy and celiac disease are two same conditions	1.52±0.51	2.00±0.00	0.48	5.16*
2	Celiac Disease is genetic or auto immune	1.29±0.29	1.98±0.49	0.69	6.64**
3	Celiac disease refers to gluten intolerance and inflammatory injury to small intestine	1.45±0.50	2.00±0.00	0.55	6.02**
4	Intestine is most affected in celiac disease	1.26±0.23	1.98±0.46	0.72	7.67**
5	Celiac patients are generally malnourished	1.31±0.27	1.89±0.43	0.58	6.26**
6	Celiac disease patients should rely on gluten free diet	1.44±0.30	2.00±0.00	0.56	10.22**
7	Celiac disease causes abdominal distention and flatulence, diarrhoea, vomiting, anemia	1.55±0.48	1.94±0.42	0.39	3.35*
8	Regular intake of gluten by celiac disease patient can lead to intestinal ulceration and cancer	1.34±0.21	1.96±0.51	0.62	6.16**
9	Change in diet required in celiac disease	1.24±0.27	1.94±0.47	0.70	7.07**
10	While purchasing gluten free food for celiac patients from the market, it is necessary to read the label	1.55±0.43	2.00±0.00	0.45	5.73**
11	Does increases consumption of fruits and vegetables helps in celiac disease	1.35±0.56	1.95±0.47	0.60	4.50**
12	Wheat and wheat products should be consumed by celiac disease patients	1.37±0.41	1.97±0.50	0.60	5.08**
13	Corn flour *laddoo* is a better choice than wheat *laddoo* for a celiac patient	1.41±0.34	1.81±0.54	0.40	3.43*
14	Gluten free diet is good for celiac disease	1.18±0.24	1.98±0.42	0.80	9.06**
15	Gluten present in wheat, ragi and barley	1.31±0.25	1.71±0.43	0.40	4.40*
16	What gluten free products available in market	1.15±0.18	1.81±0.42	0.66	7.91**
17	Quinoa and its products	1.00±0.19	1.91±0.43	0.91	10.60**
18	Quinoa is a gluten free food	1.05±0.21	1.74±0.38	0.69	8.70**
19	Price of quinoa	1.00±0.10	1.79±0.36	0.79	11.58**
20	Quinoa is a good source of protein/dietary fibre/minerals	1.11±0.21	1.81±0.45	0.70	7.72**
21	Quinoa helps in diabetes/weight reduction/heart diseases	1.08±0.15	1.71±0.35	0.63	9.06**
22	Quinoa intake improves your nutrient intake	1.02±0.11	1.84±0.32	0.82	13.27**
23	Products supplemented with quinoa are more nutritious than maize and rice products	1.24±0.25	1.91±0.43	0.67	7.38**
24	What products of maize, rice and quinoa available in the market	1.12±0.21	1.81±0.31	0.69	10.09**
25	Would you like to buy qunioa, maize and rice products	1.18±0.25	1.84±0.42	0.66	7.40**
26	You can use quinoa to make *chapati, laddoo, khichdi, dalia, kheer, pulao*?	1.26±0.21	1.81±0.37	0.55	7.08**
27	How to make quinoa *ladoo, chapati, daliya*.	1.19±0.24	1.94±0.46	0.75	7.92*

Values are Mean±S.D *Significant at 5% level of significance ** Significant at 1% level of significance

ascertain the exact extent of knowledge about the various aspects of celiac disease and quinoa. Pre exposure scores (1.00 to 1.55) depicted that respondents had very less knowledge of celiac disease, its causes, gluten free foods, quinoa and its products, price of quinoa, nutritional importance and medicinal uses of quinoa seeds. A significant increase ($P<0.01$) was observed in knowledge scores (1.71 to 2.00) regarding celiac disease, its causes, gluten free foods, quinoa and its products, price of quinoa, nutritional importance and medicinal uses of quinoa after imparting nutrition education which in line with the study of Barzegar et al., (2017). Results obtained were also in line with other workers (Barzegaret et al., 2017; Malik et al., 2019; Rajpoot & Makharia, 2013) who also reported that there was significant increase in the knowledge of celiac disease patients after imparting nutrition education. It is essential to provide proper nutrition education to celiac disease patients in order to make them aware about their nutritional needs and about different gluten free products available in market. Several other studies have also revealed that educational intervention programme lead to a significant gain in knowledge in the post test scores (Singh & Bisht, 2021; Ranjan et al., 2015; Rani, 2018).

Perceived feasibility in respect of ease of making gluten free products by celiac disease patients

All the quinoa added recipes were highly appreciated by respondents. *Laddoo* followed by porridge, *pulao* and *upma* scored highest in ease of making (Table 2).

Table 2. Perceived feasibility in respect of ease of making gluten free products by celiac disease patients

Products	Ease of making		
	Very easy	Easy	Cannot make
Upma	19	11	-
Pulao	20	10	-
Laddoo	25	5	-
Porridge	21	9	-

CONCLUSION

It is concluded that nutrition education plays an important role in knowledge gain and skill of making gluten free products of respondents. The leaflets prepared to increase knowledge about celiac disease, gluten free products and quinoa proved to be very effective. Thirty celiac disease patients with little information, attitude, or symbolic adoption were exposed to the media and they showed significant improvement in their behaviour towards consumption of different types of nutritious products and adoption of health promoting practices. A significant increase ($P<0.01$) was observed in knowledge scores (1.71 to 2.00) of patients regarding celiac disease its causes, gluten free foods, quinoa and its products, price of quinoa, nutritional importance and medicinal uses of quinoa after imparting nutrition education.

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