



# Nutritional adequacy of a gluten free diet in those newly diagnosed with celiac disease: An evidence analysis

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## Abstract

**Background:** In the United States, at least 3 million people have been diagnosed with celiac disease. The side effects of this disease are directly impacted by an individual's diet. Because of this, it is necessary to understand if gluten free diets are nutritionally adequate, specifically for newly diagnosed individuals.

**Purpose:** The purpose of this literature review is to evaluate updated research related to the nutritional quality of gluten-free diets in newly diagnosed celiac patients.

**Methods Description:** PubMed, Google Scholar, NBSCO databases were used to identify articles using key words gluten-free, diet, nutritional adequacy, and newly diagnosed. Journal articles were critically appraised using inclusion and exclusion criteria and quality criteria checklists from the EAL to ensure the literature were evidence based and nonbiased.

**Results:** The researcher rejected multiple articles due to exclusion criteria and lack of applicability. Results contradicted frequently. Commonalities among articles was the that those on gluten free diets were more likely to present low B-vitamins, iron, fiber, and magnesium levels likely due to lack of fortification of gluten-free products.

**Conclusion:** More research needs to be conducted to evaluate the nutritional adequacy of the gluten free diets in newly diagnosed patients with celiac disease. The following information could be used to advocate for additional nutrition education for celiac patients focusing not only on the exclusion of gluten, but on the implementation of a general healthful diet as well.

**Dean, D.** (2020, April). *Nutritional adequacy of a gluten free diet in those newly diagnosed with celiac disease: An evidence analysis*. Poster submitted to the Research and Scholarship Conference, Western Carolina University.

Archived version from NC DOCKS available at: <https://libres.uncg.edu/ir/wcu/listing.aspx?styp=ti&id=31330>.

# Nutritional adequacy of a gluten free diet in those newly diagnosed with celiac disease: An evidence analysis

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Nutrition and Dietetics

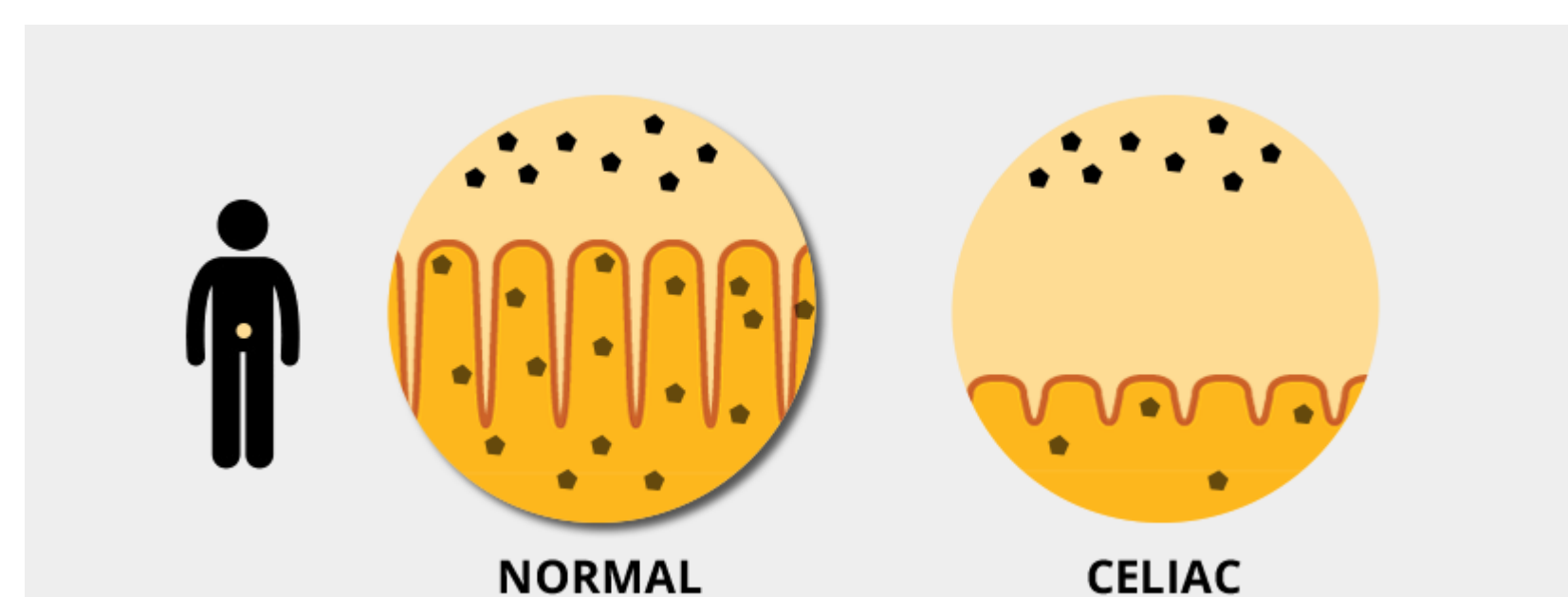
## ABSTRACT

**Background:** In the United States, at least 3 million people have been diagnosed with celiac disease. The side effects of this disease are directly impacted by an individual's diet. Because of this, it is necessary to understand if gluten-free diets are nutritionally adequate, specifically for newly diagnosed individuals. **Purpose:** The purpose of this literature review is to evaluate updated research related to the nutritional quality of gluten-free diets in newly diagnosed celiac patients. **Methods Description:** PubMed, Google Scholar, NBSCO databases were used to identify articles using key words gluten-free, diet, nutritional adequacy, and newly diagnosed. Journal articles were critically appraised using inclusion and exclusion criteria and quality criteria checklists from the EAL to ensure the literature was evidence based and nonbiased. **Results:** The researcher rejected multiple articles due to exclusion criteria and lack of applicability. Results contradicted frequently. Commonalities among articles was the that those on gluten-free diets were more likely to present low B-vitamins, iron, fiber, and magnesium levels likely due to lack of fortification of gluten-free products. **Conclusion:** More research needs to be conducted to evaluate the nutritional adequacy of the gluten-free diets in newly diagnosed patients with celiac disease. The following information could be used to advocate for additional nutrition education for celiac patients focusing not only on the exclusion of gluten, but on the implementation of a general healthful diet as well.

## INTRODUCTION

Celiac disease is an autoimmune disease to those genetically susceptible to it. The condition causes an inflammatory response in the intestinal mucosa when exposed to gliadin, a component of gluten. The damage results in a reduction in villous height and flattened villi in the small intestine. The only treatment currently available is to follow a gluten-free diet.

In the United States at least 3 million Americans, 1 in 133, have been diagnosed with celiac disease. The side effects of this disease are directly impacted by an effected individual's diet. Because of this, it is necessary to understand if the gluten-free diet followed is nutritionally adequate, specifically in newly diagnosed individuals who likely need more guidance on what to eat to achieve nutritional adequacy. This project could justify increased nutrition education for those who receive a diagnosis of celiac disease



<https://www.beyondceliac.org/ceeliac-disease/facts-and-figures/>

## METHODS

A literature review was conducted on the nutritional adequacy of the gluten-free diet. Library search engines and the Academy of Nutrition and Dietetics Evidence Analysis Library were used to find and apply applicable research articles to my research question. Each article was critically appraised, inclusion and exclusion criteria were applied, and quality criteria checklists from the EAL for each potential source was implemented to ensure the literature was evidence based and nonbiased Results were analyzed with evidence based judgement.

Inclusion criteria: Study must take place in 2006 or more recently, randomized clinical control trial, case control, cross-sectional, systematic review

Exclusion criteria: Study before 2005, meta-analysis

Conclusion Grading Table					
Strength of Evidence Elements	Grade I Good/Strong	Grade II Fair	Grade III Limited/Weak	Grade IV Expert Opinion Only	Grade V Grade Not Assignable
<b>Quality</b> • Scientific rigor/validity • Considers design and execution	Studies of strong design for question Free from design flaws, bias and execution problems	Studies of strong design for question with minor methodological concerns. OR Only studies of weaker study design for question	Studies of weak design for answering the question OR Inconclusive findings due to design flaws, bias or execution problems	No studies available Conclusion based on usual practices, expert consensus, clinical experience, opinion, or extrapolation from basic research	No evidence that pertains to question being addressed
<b>Consistency</b> Of findings across studies	Findings generally consistent in direction and size of effect or degree of association, and statistical significance with minor exceptions at most	Inconsistency among results of studies with strong design. OR Consistency with minor exceptions across studies of weaker design	Unexplained inconsistency among results from different studies OR single study unconfirmed by other studies	Conclusion supported solely by statements of informed nutrition or medical commentators	NA
<b>Quantity</b> • Number of studies • Number of subjects in studies	One to several good quality studies Large number of subjects studied	Several studies by independent investigators Doubts about adequacy of sample size to avoid Type I and Type II error	Limited number of studies Low number of subjects studied and/or inadequate sample size within studies	Unsubstantiated by published research studies	Relevant studies have not been done
<b>Clinical Impact</b> • Importance of studied outcomes • Magnitude of effect	Studied outcome relates directly to the question Size of effect is clinically meaningful Significant (statistical) difference is large	Some doubt about the statistical or clinical significance of the effect OR Size of effect is small or lacks statistical and/or clinical significance	Studied outcome is an intermediate outcome or surrogate for the true outcome of interest OR Size of effect is small or lacks statistical and/or clinical significance	Objective data unavailable	Indicates area for future research
<b>Generalizability</b> To population of interest	Studied population, intervention and outcomes are free from serious doubts about generalizability	Minor doubts about generalizability	Serious doubts about generalizability due to narrow or different study population, intervention or outcomes studied	Generalizability limited to scope of experience	NA

Evidence Analysis Library grading criteria

## Quality criteria checklist symbols for rating quality of researched

### Quality Criteria Checklist: Primary Research

#### Symbols Used

- + **Positive:** Indicates that the report has clearly addressed issues of inclusion/exclusion, bias, generalizability, and data collection and analysis.
- **Negative:** Indicates that these issues have not been adequately addressed.
- ∅ **Neutral:** Indicates that the report is neither exceptionally strong nor exceptionally weak.

## RESULTS

Many articles were rejected due to exclusion criteria. Each article that met the inclusion criteria accepted for this researched received a positive grade using the EAL's quality criteria checklists. It was found that the nutritional quality of gluten-free diets may be compromised, finding that there is a 28% lower ingredient diversity in gluten-free products. The most frequently found ingredients in gluten free products were rice flour, egg, cassava, natural corn starch, soy flour, and vanilla. Whereas the most frequent ingredients to appear on exclusively gluten-containing products were wheat flour, iron, folic acid, and hydrogenated vegetable fat. In a German dietary survey, the NVS II, it was found that the average daily micronutrient intake of male and female celiac patients was significantly lower than non-celiac patients, specifically vitamin B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, folic acid, magnesium and iron. Those with celiac disease also had low intakes of fiber, calcium and iron, and a high proportion of fat in overall energy intake (female 36.5%, male 35.9%). In an Australian study, a seven-day prospective food intake was assessed in 55 patients who were adherent to a gluten-free diet for more than two years and in 50 newly diagnosed patients who reflected age and sex of the long term gluten-free diet followers, were followed prospectively over twelve months on the diet. Intake was compared with the Australian Nutrition Recommendations and the Australian population data. Nutritional intake was found to be similar between both newly diagnosed patients and long term patients. More than 1 in 10 of both newly diagnosed and experienced women in the study had inadequate thiamin, folate, vitamin A, magnesium, calcium and iron intakes. More than 1 in 10 newly diagnosed men had inadequate thiamin, folate, magnesium, calcium, and zinc intakes. The inadequacies were similar in patients before and after celiac diagnosis except for thiamin and vitamin A, which developed after gluten-free diet implementation. A study on pediatric patients with celiac disease found that children have a tendency regardless to consume excess fat and insufficient fiber, iron, vitamin D and calcium compared to recommendations. Children on a gluten free diet may have worsened deficiencies and studies have demonstrated that intakes of folate, magnesium, zinc, and selenium may be insufficient on the gluten free diet in a pediatric population.

## CONCLUSIONS AND RECOMMENDATIONS

Gluten free products are commonly made with non-fortified refined raw materials which results in products with low contents of B-complex vitamins, iron, folate, and dietary fiber when compared to gluten containing counterparts. In the U.S. corn flour was just recently mandated to be fortified and advocacy may be necessary to fortify other common gluten-free products. The common deficiencies found among all the studies information may indicate that dietary education in celiac patients should also address the achievement of adequate micronutrient intake and a generally healthful diet that is nutritionally balanced and particular food categories and combinations that contain micronutrients that are of common deficiency in celiac patients. More research needs to be conducted on this topic to evaluate the nutritional adequacy of gluten-free diets in newly diagnosed patients with celiac disease.



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