

THE IMPORTANCE OF EXCLUSIVE BREASTFEEDING IN INFANTS AT RISK FOR CELIAC DISEASE

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ABSTRACT

This article presents a review of studies examining the association between breastfeeding and delayed symptomatic celiac disease and provides implications for practice. Celiac disease is a chronic intestinal disease involving intolerance to gluten. Symptomatic celiac disease varies in presentation and may include malabsorption, diarrhea, steatorrhea, and malnutrition. Its etiology is multifactorial, related to genetic susceptibility and exposure to gluten. Exclusive breastfeeding, with its many health benefits, may mitigate or delay symptomatic celiac disease. Because infants with a positive family history of the disease could be affected, it is crucial to identify those at risk and educate and advise parents regarding the importance of exclusive breastfeeding.

Key words: Celiac disease; Exclusive breastfeeding.

Celiac disease is a chronic autoimmune disease that involves intolerance to gluten and occurs in people with a genetic predisposition (Green & Jabri, 2006). Once considered a rare disease, the prevalence of the disease appears to be increasing, possibly related to environmental factors and/or to previous misdiagnosis or underdiagnosis (D'Amico et al., 2005; Fasano et al., 2003; Hernell, Ivarsson, & Persson, 2001). Because the disease has variable presentation and high rates of asymptomatic individuals (Hoffenberg, et al., 2003), the true prevalence of the disease is not known. Recent studies using serologic screening indicate that celiac disease was underdiagnosed and that it is more common than traditionally believed (Fasano et al., 2003; Hill et al., 2000). European studies have estimated pediatric celiac disease prevalence at approximately 1% (Bingley et al., 2004; Carlsson, Axelsson, Borulf, Bredberg, & Ivarsson, 2001; Maki et al., 2003). A population-based study in the United Kingdom found that although 1% of children were serologically positive for celiac disease, less than 0.1% of the children followed gluten-free diets (Bingley et al., 2004). In the United States, a prospective incidence study employing serologic screening identified nearly 1% of the participating children as having a high risk of celiac disease (Hoffenberg et al., 2003). In a study of children identified by serologic screening as being at risk of celiac disease who presented at either gastroenterology or pediatric endocrinology clinics, the findings suggested that the prevalence rate may be as high as 3% (Hill et al., 2000). A recent cross-sectional study conducted in the United States found greater disease frequency among people with a first- or second-degree relative with celiac disease (4.5% and 2.6%, respectively) (Fasano et al., 2003).

Etiology

The disease etiology is not yet fully understood. It is probably multifactorial, because there is an interaction between genetic susceptibility and environmental factors, specifically dietary exposure to gluten. When



this interaction occurs, an immunologic inflammatory response of the intestines causes mucosal damage and the classic symptoms of celiac disease: diarrhea, abdominal distension, steatorrhea, and malabsorption resulting in malnutrition and failure-to-thrive. Symptom presentation varies widely, making the diagnosis a challenging one. Intestinal biopsy is considered the gold standard for the diagnosis of celiac disease and may show progressive histological changes, including villi atrophy, elongation and hyperplasia of the crypts, increased intraepithelial lymphocytosis, and infiltration of plasma cells, lymphocytes, mast cells, and eosinophils (Hill et al., 2002). When celiac disease is suspected, other less invasive tests may be performed before biopsy for screening purposes, including nutrient deficiency tests, fecal fat tests, contrast radiography, and gluten challenge tests. For asymptomatic family members of an affected individual, serologic screening may be recommended (Murray, 1999).

Preventing Symptoms in At-Risk Infants

As awareness and knowledge of celiac disease increases among healthcare professionals, their ability to manage,

minimize, delay, or prevent its symptomatic manifestation improves. Owing to the gene-environment interaction, it is crucial to minimize exposure in genetically at-risk infants, specifically with regard to infant feeding practices. Exclusive breastfeeding has been demonstrated to have protective effects for infants against acute and chronic diseases, including symptomatic celiac disease (D'Amico et al., 2005; Ivarsson, Hernell, Stenlund, & Persson, 2002). Although exclusive 6-month breastfeeding duration in the United States has been increasing (1990 rate of

10.4% vs. 2000 rate of 16%) (Ryan, Wenjun, & Acosta, 2002), there is still a need for progress that would further promote infant health and lower infant morbidity.

In providing protective function of gastrointestinal system, human milk enhances immune function (Kelly & Coutts, 2000), stimulates maturation of the intestinal epithelium, and complements the protective character of the intestinal mucosa serving a barrier function (Newburg, 2005). Although the exact mechanisms involved have not been confirmed, the factors influencing the association between the prevention of autoimmune diseases and ingestion of human milk may include the high proportion of polyunsaturated fatty acids (Hanson et al., 2002) and the anti-inflammatory activity of human milk (Kelly & Coutts, 2000). The anti-inflammatory activity, possibly related to the factors present in human milk—including secretory IgA that prevents dietary antigen uptake—suppresses inflammatory immune responses that have deleterious potential (Kelly & Coutts, 2000). The secretory IgA in human milk protects the infant against microbes in the maternal gut and prevents microbes from attaching to the infant's intestinal mucosal surface



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(Hanson et al., 2003). Thus, the protective functions of human milk promote the growth and maintenance of an intact and healthy gastrointestinal system as well as augment the immune system in the developing infant.

Association of Infant Feeding Patterns and Celiac Disease

Research has examined the relationship between infant feeding patterns and celiac disease. Because celiac disease manifests after exposure to gluten, much focus has been on the age of infants' exposure to cereals containing gluten. In the 1980s, there was an epidemic of celiac disease among children in Sweden. Researchers in Sweden found that during the epidemic time period, there had been a twofold increase in the average dietary exposure of infants to gluten-containing formula (Hernell et al., 2001). By the end of 1982, in response to the epidemic, national recommendations for infant feeding practices included delaying the introduction of gluten until 4-6 months of age. Further alterations in the national recommendations have been made, and indeed, the incidence rates of celiac disease among children in Sweden have decreased in the past decade. In comparison to celiac disease rates in Sweden, the rates in Estonia were noted to be lower, possibly reflecting the decreased dietary exposure of Estonian infants to gluten as compared to the dietary exposure of Swedish infants (Mitt & Uibo, 1998).

However, the development of symptomatic celiac disease is not only related to dietary exposure to gluten but is also negatively associated with breastfeeding. In a retrospective study in the United States of 141 biopsy-proven celiac disease among children, D'Amico et al. (2005) compared infants exclusively breastfed for at least 6 months with all other infants. The findings showed that the exclusively breastfed children developed symptomatic celiac disease significantly later than the children who had not been exclusively breastfed as infants. The study also showed that exclusively breastfed children had lower rates of failure-to-thrive and short stature than the other children (D'Amico et al., 2005). Research strongly suggests that breastfeeding plays a protective role in the development of symptomatic celiac disease (D'Amico et al., 2005; Ivarsson 2005; Ivarsson et al., 2002; Peters, Schneeweiss, Trautwein, & Erbersdobler, 2001), although there is a need for prospective studies to further understand this association and to establish causality (Nash, 2003) and to identify ways to prevent the disease (Ivarsson, 2005).

In Malta, breastfeeding rates have increased, and the introduction of gluten-containing foods has been delayed till until 4 months of age because of the adoption of the World Health Organization's breastfeeding promotion program called the Baby Friendly Hospital Initiative. In a small study

of children in Malta with celiac disease, delayed diagnosis of the disease was noted as breastfeeding rates have increased, again indicating that breastfeeding provides protection against early development of symptomatic celiac disease (Vella & Grech, 2004). Indeed, the gastrointestinal protective and growth promotional nature of human milk is well documented (Goldman, 2000). An incident case-referent study in Sweden found that the risk of celiac disease was significantly reduced in infants (<2 years old) when they were breastfed at the same time they were introduced to gluten-containing foods. The researchers also showed that increased exposure to gluten placed the infants at higher risk of developing celiac disease. The cases were introduced to a larger amount of gluten-containing foods (>7 g of flour) in the first half year of life than the referents, mostly given in the form of formula. Likewise, at 7 months of age, the cases had received relatively higher amounts (>58 g of flour) of gluten-containing foods (Ivarsson et al., 2002). These researchers described a multifactorial association between the development of celiac disease and exposure factors: the amount of gluten consumed, the age at which gluten was introduced, and the continuation of breastfeeding (Ivarsson et al., 2002).

In a recent systematic review of the literature and meta-analysis, breastfeeding at the time of gluten introduction reduced the risk of developing celiac disease by 52% (Akobeng, Ramanan, Buchan, & Heller, 2006). Akobeng and Heller (2006) describe the use of an analytic method called the population impact number of eliminating a risk factor over a time period (PIN-ER-t) for breastfeeding and celiac disease (as well as two other chronic diseases, asthma and obesity), estimating the number of disease cases that could be prevented by eliminating the "no-breastfeeding" risk factor.

Continued attention should be focused on the interactive relationship between genetic susceptibility and environment because further research is necessary to better understand this multifactorial disease. Further investigation should be made into specifically defined infant feeding practices and the development of celiac disease in at-risk children. For example, exclusive and partial breastfeeding should be carefully assessed and defined for research examining celiac disease and breastfeeding. Investigation should also be made into other possible factors potentially affecting the development of symptomatic celiac disease, such as maternal diet during pregnancy and lactation, that may potentially be associated with symptomatic celiac disease.

Nursing Implications

This review of the recent published studies examining the relationship between breastfeeding and symptomatic celiac disease includes only one published review provided by the nursing literature. Because nursing plays a primary role in

educating and guiding families in infant feeding and promoting family health, it is important for nursing to take a more active role in researching this area of infant and pediatric health. Nursing research should explore factors that influence the development of symptomatic celiac disease by expanding the current research to include an investigation of maternal diet during pregnancy and lactation and examining more details regarding breastfeeding patterns during infant development.

Nurses should play an active role in the education, research, and dissemination of information regarding the relationship between human milk and symptomatic celiac disease (see Box 1). Better efforts are needed to make the multidisciplinary team of healthcare professionals more knowledgeable about the classic symptoms of celiac disease as well as the various nonclassic clinical and subclinical presentations that may occur. Increasing public awareness and education regarding celiac disease may facilitate improved diagnosis, management, and treatment of those affected by the disease, mitigating complications associated with the disease.

Because early identification of celiac disease is crucial for timely treatment and in the light of the relatively high frequency prevalence of celiac disease among children with first- and second-degree relatives with celiac disease, serologic screening is advised for at-risk individuals. When conducting prenatal assessments, the nurse or midwife should inquire about celiac disease history of the pregnant woman and her partner to identify potentially at-risk families and infants. Because nurses, midwives, and lactation consultants often have direct contact with parents regarding infant feeding education and breastfeeding initiation, it is crucial that they emphasize adherence to exclusive breastfeeding. Considering the protective nature of human milk, parents of infants who are at risk of developing celiac disease should be educated on the potentially critical benefits of exclusive breastfeeding in the first half year of life, specifically the protection that breastfeeding may afford against the development of symptomatic celiac disease in infancy and childhood.

Although exclusive breastfeeding is recommended for nearly all infants, for families with increased risk factors of celiac disease, it is especially important to encourage 6 months of exclusive breastfeeding followed by a gradual introduction to foods with continued breastfeeding. The di-



CLINICAL IMPLICATIONS

- Nursing research should explore factors that may influence the development of symptomatic celiac disease, including breastfeeding patterns and maternal diet during pregnancy and lactation.
- Assess expectant families for risk factors associated with celiac disease and recommend serologic screening for those at risk.
- Increase awareness and education on celiac disease in the community of healthcare providers and consumers.
- For at-risk infants, emphasize adherence to exclusive breastfeeding for 6 months, suggest delay of gluten-containing foods, advise gradual and careful introduction of gluten-containing foods with continued breastfeeding, and recommend continued breastfeeding duration to afford extended protection.

etary exposure of gluten-containing foods should be done cautiously and gradually, preferably delaying the exposure until later infancy, while continuing to breastfeed (Ivarsson et al., 2002). One author emphasized that the amount of gluten-containing foods fed to an infant may be as important—if not more important—than as the timing of gluten introduction (Farrell, 2005). Parents should be advised to continue providing human milk to their infant when introducing gluten, thereby extending the protection against symptomatic celiac disease. ❖

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