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Immunological Mediators of Breast Feeding to Protect against Celiac Disease

Haniye Ghasiyari[1], Mohammad Rostami Nejad[2,*], Mohammad Reza Zali[2]

[1]Basic and Molecular Epidemiology of Gastrointestinal Disorders Research Center, Research Institute for Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2]Gastroenterology and Liver Diseases Research Center, Research Institute for Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran
*Corresponding author: m.rostamii@gmail.com

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Celiac disease (CD) as an immune mediated systemic disorder is caused by a permanent sensitivity to gluten [1,2] in genetically susceptible individuals who are carrying the HLA-DQ2 and/or HLA-DQ8 haplotypes and characterized by a the wide range of clinical manifestations [3,4]. Current knowledge indicates that intestinal immune responses to gluten can damage the small intestine [4].

While both genetic and environmental factors are involved in the etiology of celiac disease, the genetic factors are a key actors in the development of the disease. On the other hand some environmental risk factors such as dysbiosis of gut microbiota plays an important role for the subsequent development of CD [5].

Recent epidemiological studies suggest that breast feeding (BF) at the time of dietary gluten introduction has protective value to delays the onset of symptoms CD in infants [6,7]. In this regard, studies have shown that the prevalence of the celiac disease in developing countries like India with low rates of breast feeding is more than developed countries [8].

Recently Szajewska et al. [9] proposed the primary prevention of CD via breast feeding in infants and children. They demonstrated that BF is reduce the risk of CD development and reprieve the introduction of gluten in infants' diet can delays onset of symptoms CD [9].

Meta-analysis study by Akobeng et al. [10] also showed that there is an association between increasing duration of BF and decreased risk of developing CD. Accordingly the risk of development of CD in children being BF at the time of gluten introduction was 52% decreased compare with their peers who were not.

These studies also confirmed that longer breastfeeding is expressively degraded the possibility of development of CD [9,10]. It is, however, not clear whether it merely delays the onset of symptoms or provides constant protection.

Now this question may raised, how breastfeeding could protective against celiac disease development? At birth, the immune system of infants are very weak and some part of their defense provides via breast milk [11]. In that time, IgA antibodies transferred from the maternal milk can provide passive immunity against gut infections such as enterotoxic *Escherichia coli* (ETEC) [12], *Shigella* [13], *Campylobacter* [14] and *Vibrio cholera* [15]. On the other hand, it may decrease immune response to ingested gluten peptides by mechanisms such as agglutination of the antigen to immune complexes on the mucosal surface and prevention of antigen uptake and thus lead to reduce the risk of CD (Figure 1) [16].

Another protective factors of human milk are including Lactoferrin and oligosaccharides. Human Lactoferrin has anti-inflammatory capacity that it blocking the production of IL-1β, TNF, IL-6 and IL-8 and result in protection against microbial infections [17]. Also substantial fraction of oligosaccharides as analogues for microbial receptors can prevent from attachment of mucosal infections to epithelium (Figure 1) [11,18]. This issue is very important because in the early life of infant that the immune system is weak and in a few percent of adults, infections of the gastrointestinal tract with increased permeability of the intestinal mucosa and tissue transglutaminase expression leading to triggering CD in susceptible individuals [11,16]. In contrast some studies showed that in infants who were breast feeding at the time of gluten introduction, the risk of CD was significantly reduced compared with those who were not breast feeding during this period [9,10]. In addition to the mentioned factors, human milk contain many bioactive factors such as hormones, enzymes and growth factors which can help development of the infant's innate and acquired immunities (Figure 1) [19,20]. On the other side the BF effect on preliminary intestinal microbiota and therefore prevents induction of immune-mediated diseases. Its possible mechanism is that BF motivate the production of a proportionate and diverse microbiota (*Bifidobacteria, Lactobacillus, and Bacteroides*), by activation of T-regulatory cells which primarily effects a switch from Th2 predominant to a Th1/Th2 balanced response.

In conclusion available evidences suggests that according to the important role of BF in the development of different disorders, such as CD, long term prospective cohort studies are required to investigate different aspects of relationship between breast feeding and CD.

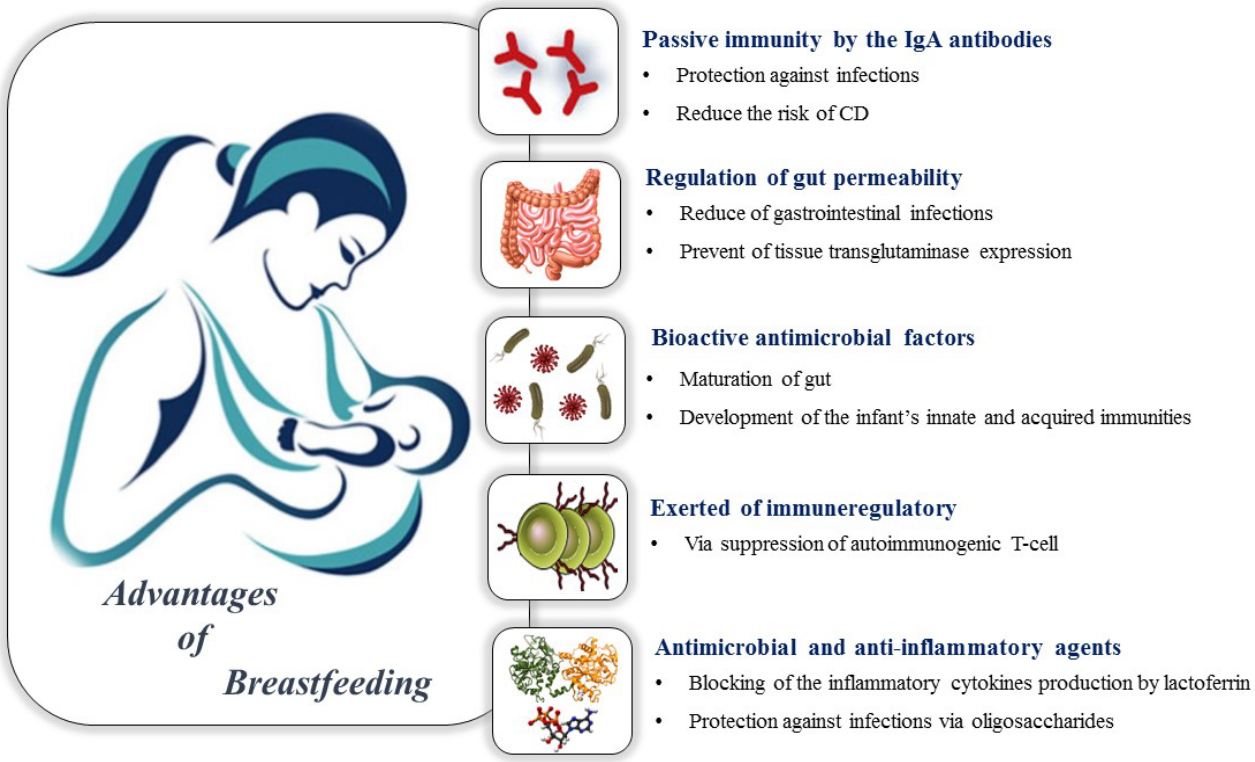

Figure 1. Protective effects of breast feeding against development of celiac disease

References

[1] Green PHR, Cellier C. Celiac disease. N Engl J Med. 2007 Oct 25; 357(17): 1731-43.

[2] Farrell RJ, Kelly CP. Celiac sprue. N Engl J Med. 2002 Jan 17; 346(3): 180-8.

[3] Bourgey M, Calcagno G, Tinto N, Gennarelli D, Margaritte-Jeannin P, Greco L, et al. HLA related genetic risk for coeliac disease. Gut. 2007 Aug; 56(8): 1054-9.

[4] Bao F, Green PHR, Bhagat G. An update on celiac disease histopathology and the road ahead. Arch Pathol Lab Med. 2012 Jul; 136(7): 735-45.

[5] Kupfer SS, Jabri B. Pathophysiology of celiac disease. Gastrointest Endosc Clin N Am. 2012 Oct; 22(4): 639-60.

[6] Ascher H, Krantz I, Rydberg L, Nordin P, Kristiansson B. Influence of infant feeding and gluten intake on coeliac disease. Arch Dis Child. BMJ Publishing Group Ltd and Royal College of Paediatrics and Child Health; 1997 Feb 1; 76(2): 113-7.

[7] Silano M, Agostoni C, Sanz Y, Guandalini S. Infant feeding and risk of developing celiac disease: a systematic review. BMJ Group; 2016; 6(1): e009163.

[8] Travasso C. Low rates of breast feeding in India require national action, says report. BMJ. 2015; 351: h4832.

[9] Szajewska H, Shamir R, Chmielewska A, Pieścik-Lech M, Auricchio R, Ivarsson A, et al. Systematic review with meta-analysis: early infant feeding and coeliac disease--update 2015. Aliment Pharmacol Ther. 2015; 41: 1038-54.

[10] Akobeng AK, Ramanan AV, Buchan I, Heller RF. Effect of breast feeding on risk of coeliac disease: a systematic review and meta-analysis of observational studies. Arch Dis Child. 2006; 91(1): 39-43.

[11] Hanson LÅ, Korotkova M, Håversen L, Baltzer IM, Hahn-zoric M, Silfverdal S, et al. Breast-feeding , a complex support system for the offspring. Pediatr Int. 2002; 44(4): 347-52.

[12] Cruz JR, Gil L, Cano F, Caceres P, Pareja G. Breast milk anti-Escherichia coli heat-labile toxin IgA antibodies protect against toxin-induced infantile diarrhea. Acta Paediatr Scand. 1988 Sep; 77(5): 658-62.

[13] Hayani KC, Guerrero ML, Morrow AL, Gomez HF, Winsor DK, Ruiz-Palacios GM, et al. Concentration of milk secretory immunoglobulin A against Shigella virulence plasmid-associated antigens as a predictor of symptom status in Shigella-infected breast-fed infants. J Pediatr. 1992 Dec; 121(6): 852-6.

[14] Ruiz-Palacios GM, Calva JJ, Pickering LK, Lopez-Vidal Y, Volkow P, Pezzarossi H, et al. Protection of breast-fed infants against Campylobacter diarrhea by antibodies in human milk. J Pediatr. 1990 May; 116(5): 707-13.

[15] Glass RI, Svennerholm AM, Stoll BJ, Khan MR, Hossain KM, Huq MI, et al. Protection against cholera in breast-fed children by antibodies in breast milk. N Engl J Med. 1983 Jun 9; 308(23): 1389-92.

[16] Sollid LM. Breast milk against coeliac disease. Gut. BMJ Publishing Group Ltd and British Society of Gastroenterology; 2002 Dec 1; 51(6): 767-8.

[17] Håversen LA, Baltzer L, Dolphin G, Hanson LA, Mattsby-Baltzer I. Anti-inflammatory activities of human lactoferrin in acute dextran sulphate-induced colitis in mice. Scand J Immunol. 2003 Jan; 57(1): 2-10.

[18] Andersson B, Porras O, Hanson LA, Lagergård T, Svanborg-Edén C. Inhibition of attachment of Streptococcus pneumoniae and Haemophilus influenzae by human milk and receptor oligosaccharides. J Infect Dis. 1986 Feb; 153(2): 232-7.

[19] Liu J, Leung P, Yang A. Breastfeeding and active bonding protects against children's internalizing behavior problems. Nutrients. Multidisciplinary Digital Publishing Institute (MDPI); 2014 Jan; 6(1): 76-89.

[20] Newburg DS. Innate immunity and human milk. J Nutr. 2005 May; 135(5): 1308-12.