Infant & Young Child Feeding n Nutrition in Perspective 透視嬰幼兒餵哺與營養

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Prebiotics and Probiotics

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Breast milk is the gold standard of nutrition for infants. Not only does it provide optimal proportion of nutrients, it contains a host of immune-active components which confers its unique immunomodulatory effect on the infant's health. Among these immunomodulatory components, probiotics and prebiotics have drawn intense interest over the last decade. Increasing number of normal infant formulas are added pre- and/or probiotics as an attempt to mimic the benefit of breast milk in aiding the development of immunity and prevention of childhood problems like constipation, colic and allergy.

What are probiotics?

A probiotic is an oral supplement or food product that contains a sufficient number of viable mircoorganisms to alter the microflora of the host and has the potential for beneficial health effects. The main probiotics found in breast milk belong to the species of Lactobacillus and Bifidobacterium.

What are prebiotics?

Prebiotics are mainly oligosaccharides which are non-digestible ingredients that benefit the host by selectively stimulating the growth of the beneficial bacteria in the colon. Approximately 8% of carbohydrates in breast milk are oligosaccharides. Human breastmilk contains over 200 different oligosaccharides.

Pre- and Probiotics in Breast Milk

Breast-fed infants' gut has a much heavier colonisation of 'good bacteria' than formula fed infants which compete with the pathogenic bacteria and protect the infants against viral and bacterial infection in early life such as gastroenteritis and respiratory tract infections. Preterm infants fed with breast milk have significantly lower risk of necrotising enterocolitis. The gut microflora also interacts with the intestinal epithelial cells and promotes the development of an adaptive immune system which helps in the prevention of atopy.

Addition of Pre- and Probiotics in Artificial Formulas

Various strains of probiotics have been added to artificial formulas (Table 1) but studies have yielded contradictory results on their clinical effects in the prevention of gastrointestinal and respiratory tract infection, constipation and colic. This is related to the different strains and concentration of the probiotics and methodology used in these studies. The immunomodulatory effect of breast milk is likely the result of the dynamic interaction between various bioactive agents and the environment. Thus, addition of just one or a few components at fixed concentration is unlikely to mimic the clinical benefits of breast milk.

Prebiotic oligosaccharides have also been added to mimic the breast milk in stimulating bifidobacteria and lactobacilli growth. A few studies have shown that a mixture of short chain fructo-oligosaccharides and galacto-oligosaccharides to long chain fructo-oligosaccharides can achieve a gut flora similar to that of breast-fed infants and lower the incidence of diarrhoea and respiratory tract infections. A few clinical trials have suggested addition of prebiotics to hypoallergenic formulas reduces incidence of atopic dermatitis. There is also some limited evidence to show that prebiotics supplemented formula can reduce stool pH and lead to increased stool frequency and softer stool. Nevertheless, in February 2010, the European Food Safety Authority (EFSA) found insufficient evidence and refused to support the health claim that prebiotics added to infant formula "naturally strengthen the baby's immune system" for babies up to 12 months of age.

Despite some benefits shown in individual clinical trials, systematic review by the European Society for Paediatric Gastroenterology, Hepatology and Nutrition and a clinical report by the American Academy of Paediatric both concluded that there is insufficient data to support routine addition of prebiotics or probiotics to infant formula. More well-designed randomised controlled trials need to be conducted to address the issue. Nevertheless, if parents choose infant formula with probiotics, health professionals should advise them not to follow the manufacturer's instructions to use water of temperature less than 70°C in preparing the formula. Using hot water above 70°C (within 30 minutes after boiling) would kill harmful bacteria which may be present in the powdered infant formula. Table 1: Examples of locally marketed formula milk brands containing probiotics and/or prebiotics(Source: Product information from company websites and product labels, accessed in August 2017)

	Mead Johnson	Mead Johnson	Mead	Cow & Gate	Cow & Gate
	Platinum:	A+: Enfamil,	Johnson:	Happy Baby 1	Happy Kid
	Enfamil,	Enfapro,	Enfinitas 1, 2	& 2	3 & 4
	Enfapro,	Enfagrow,	& 3		
	Enfagrow 1, 2	Enfakid 1, 2, 3			
	& 3	& 4			
Probiotics				~	✓
Prebiotics	~	✓	~	✓	✓

	Nutricia	Nutricia	Nestle	Nestle Nan	Wyeth	Wyeth
	Aptamil	Aptamil	Nan Pro	Pro 3 & 4	Illuma	Illuma
	Pronutra+	Profutura	1&2		1 & 2	3 & 4
	1, 2, 3 & 4	1,2, 3 & 4				
Probiotics			✓	~		
Prebiotics	✓	✓			~	✓

	Frisolac, Friso	Friso Young	Wyeth S-26	Wyeth S-26	Wyeth PE
	First Step	Explore,	Gold	Progress	Gold
	Gold	Bright Star	1& 2	3 & 4	
	1&2	Gold	& 3		
		3 & 4			
Probiotics		✓			
Prebiotics	✓	✓	✓	✓	✓

	Abbott	Abbott Eleva	Abott	Snow brand	Snow brand
	Similac	Organic	PediaSure	Smart Baby	Smart Kid
	1, 2, 3 & 4	1,2&3	Complete	1 & 2	3 & 4
Probiotics			✓		
Prebiotics	✓	✓	✓	✓	✓

Key Message:

Breast milk provides natural source of pre- and probiotics which bring clinical benefits in the prevention of infection and development of adaptive immunity. There is insufficient scientific evidence currently to suggest such clinical benefits observed in breastmilk can be mimicked by routine addition of probiotics and/or prebiotics to artificial formula.

母乳含天然益生元和益生菌,有助嬰兒預防感染和發展免疫力。目前沒有足夠的科學証據顯示

· 於配方奶添加益生元和益生菌可達致同樣的效益。

Views expressed in this article are the author's and do not necessarily reflect the opinion or position of the BFHIHKA.

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