Functional gastrointestinal (GI) disorders are considered common today, especially within 12 months of age. Many aspects of infant gut comfort is based on the intake of long-chain saturated fatty acids (LCSFAs) in infants, fat composition of the milk, the whey:casein ratio, and lactose intake. Knowing how each of these affects infant gut comfort could lead to better management of common functional GI disorders.

Functional GI disorders are common in infancy and in early childhood, especially in a developing country such as India. The most common GI disorders include infantile colic with a prevalence of 2%–73%, regurgitation at 3%–7%, functional constipation at 0.05%–39.3%, functional diarrhoea at 2%–4.1%. The symptoms of functional GI disorders are commonly observed in infancy either as a part of normal physiological development or due to maladaptive behavioural responses to stimuli. Gastrointestinal distress in infants has been closely linked to dysbiosis of gut microbiota, intolerance to cow’s milk, improper feeding and delayed gastric emptying which could lead to lowered gut comfort in infants. Also, the long-term effects of such issues could lead to behavioural problems later.

Fats are the main source of energy for infants and young children, whereas fatty acids are essential for growth and development. Fats in the food provide the child with flavor and texture of food, thereby affecting the acceptability of foods, gastric emptying, and satiety in the GI tract. In addition, fats are necessary for important metabolic and physiological functions such as absorption of fat-soluble vitamins and supplying fatty acids.

Potential Effects of Long-Chain Saturated Fatty Acids (LCSFAs):
Importance of Stereospecific Positioning

Adequate nutrition in infancy and early childhood enhances both the development and the functioning of the immune system and protects the child from several illnesses. Hence, much research has been focused upon the potential of LCSFAs. Infants receive LCSFAs from an important dietary source, that is, human milk, which contributes to favorable outcomes in the gut comfort of infants. Evidence suggests that the stereospecific positioning of these LCSFAs play an important role in gut comfort. In human milk, which is the gold standard for infant nutrition, about 70–75% of the palmitic acid (forms 20–25% of mature human milk) is esterified at sn-2 position. The fatty acids in the sn-2 position are hydrolysed to form 2-monoacylglycerols, which are absorbed by passive diffusion and cannot form insoluble soaps with calcium and magnesium, resulting in hard stools. The breast or the human mammary gland in this aspect has evolved unusual pathways for the acylation of fatty acids into triglycerides, leading to a different triglyceride structure in breast milk from those that are found in human tissues, plasma, or dietary fats and oils. Therefore, studies have provided evidence that the unusual positioning of palmitic acid in breast milk may play a significant role in calcium and fat absorption, intestinal flora and increased infant comfort. Other studies such as those conducted by Nowacki et al. suggest that increasing sn-2 palmitates in infant formula can...
reduce stool palmitate soaps, while also promoting softer stools. Therefore, LCSFAs can have significant
effect on the impact on gut comfort.\textsuperscript{10}

Whey and casein are two proteins that are present in breast milk. The whey:casein ratio based on the stage
of breast milk ranges from 70:30 to 80:20 in early lactation to 50/50 in late lactation periods. In cow’s milk,

(casein proteins are found in higher proportions with a whey:casein ratio of 18:82.\textsuperscript{12,13} In the gut, casein
tends to form clots or curds while on the other hand whey remains a liquid, which makes them easier to
digest. Whey proteins are also broken down rapidly into free amino acids after ingestion that initiates and
enhances absorption.\textsuperscript{12} As a result of these characteristics, whey-predominant formulas are preferred,
especially in constipation. This is because whey predominant formulas decrease stool hardness and also
aid in relieving constipation. Casein-predominant formulas cause constipation more frequently than
human milk or whey predominant formulas. The whey-casein ratio could also have a role in gastric
emptying.\textsuperscript{11} A study conducted by Billeaud et al.\textsuperscript{14} suggested that gastric emptying in infants who were
breastfed or had more whey protein was faster compared to those fed with hydrolyzed whey formula,
casein predominant formula and cow’s milk.\textsuperscript{14}

A good gut health is characterised by an optimal number of lactobacilli. However, increased numbers of
clostridium and lesser numbers of lactobacilli signify an unusual microbiota, leading to issues such as
allergies, GI discomfort and its associated issues. In comparison to breast milk, cow’s milk has lesser lactose
in its composition; in a breast-fed infant 40% of the energy comes from lactose.\textsuperscript{15} Lactose is a prebiotic that
enhances the production of commensal bacteria. In the gut, lactose is metabolised by anaerobic bacteria
that increases the inflow of water and hence has a laxative effect thus making stools softer.\textsuperscript{16} Besides this,
lactose also significantly improves nutrient absorption which is necessary to maintain the good bacteria in
the gut thereby improving gut comfort.\textsuperscript{17} Adding lactose to the diet also modulates the gut microbiota by
increasing the count of lactobacilli, which is an important component of gut health.\textsuperscript{18,19}

**Importance of Whey: Casein Ratio for Reduction of Constipation**

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**Importance of Lactose in Gut Comfort**

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Gut Comfort in Infancy

Conclusion

As functional GI disorders are common, there is a need to better understand how to manage these conditions and restore the gut for optimal comfort of the infant. Although the aetiology of such disorders remains yet unknown, understanding different components, such as fatty acids, fat, stereospecific positioning, and the importance of the whey:casein ratio along with the need for lactose, makes prevention and management of these disorders relatively easier.

References