

Variation of proteins in commonly used infant formulae in Sri Lanka

Milk protein which is of high biological value is a complex of several protein families. Thus a knowledge on different protein classes are of immense value to understand different allergic conditions.

Ten commercially available infant formulae were analysed for their total protein content and were subjected to SDS-PAGE. Total nitrogen (N) content of milk was estimated by Kjeldhal method. Lowrey assay was performed on both whey and skimmed milk. Bovine serum albumin was used as a protein standard. Pure milk proteins (β -lactoglobulin, β -lactalbumin and caseins) were used as molecular markers. Ion exchange Chromatography was also performed using a 5 mL DE - 52 cellulose (pH 7) column to separate the whey proteins. 0 - 1 M NaCl gradient was used to elute the sample.

The total protein content ranges from 11.0 - 23.7 g in infant formulae while the whey proteins ranged from 1.1 to 3.6 g / 100 g, It was 0.7 g and 0.5 g for human milk and cow's milk respectively.

The SDA - PAGE Pattern reveals 4 distinct groups of milk proteins. The milk proteins are identified as immunoglobulins [>77 kDa] Bovine serum albumin [68 kDa], Caseins [38.9 kDa - 31.3 kDa], β - lactoglobulins [17.9 kDa] and α - lactalbumin [13.9 kDa]. All the brands of infant milk formulae and fresh cow's milk show 3 bands for caseins. They are identified as the α_{s1} - casein [38.9 kDa], α_{s2} - casein and β - casein [31.3kDa]. However, human milk shows only 2 bands for caseins. It lacks the highest molecular weight band of casein, which is assumed to be the α_{s2} - casein. α lactalbumin, content does not vary much among the infant milk formulae and cow's milk. The α - lactalbumin content for these is very much less than that of breast milk. β - Lactoglobulin is also present in all 10 brands. Enfalac. Cow & Gate Premium and Nan- 1 have the most prominent bands for β - lactoglobulin. Six brands of infant milk formulae [Lactogen-formula I, Lactogen formula - II, SMA, SMA progress, Cow & Gate plus, Cow & gate Blue] showed prominent casein bands. Whereas other 4 brands Cow Gate premium, Enfalac, Nan - 1 and S - 26 showed less prominent bands for casein. Although formula S - 26 had the highest amount of whey proteins β - lactoglobulin band was of low intensity. The major whey protein fraction was β - lactoglobulin. It eluted between fraction 9 and 12.

The results of this study revealed that the individual protein pattern varied among infant milk formulae. The rapid chromatographic procedure developed may stand in good stead if and when the need arises for the future researchers to analyse qualitatively and quantitatively the whey proteins.