A-24: Analysis of protein patterns in milk formulae marketed in Sri Lanka

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Milk proteins are implicated in food allergies world-wide. In Sri Lanka, over 80% of milk is consumed in the from of powdered milk in contrast to other countries where fresh milk is popular. The high keeping quality, availability, and the popular notion that powdered milk is less of a health hazard compared to fresh cow milk has led to increased powdered milk consumption, Most manufacturers of powdered milk indicate the protein content as a percentage but, the composition of individual milk proteins are not revealed. Therefore, it has become difficult to assess the role of powdered milk products in inducing food allergy. In this study, a variety of commercially available powdered milk formulae were analysed to determine the protein content, its pattern and the concentration of specific milk proteins, which are known to be associated with allergies in man.

A total of 16 brands of milk powder which included 9 whole milk formulae (WM 1-9) 4 infant formulae (IF 1-4) and 3 malted milk preparations (MM 1-3) were studied. Each preparation was reconstituted according to the manufacturers instructions to make up to 50 ml. An aliquot of this preparation was skimmed by centrifuging (at 4000 RPM, 15 min, at 4°C) for total protein estimation by micro Kjeldhal and biuret methods. A further aliquot was subjected to protein analysis by sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE); pure milk proteins (β-lactoglobulin, α-lactalbumin and caseins) were used as molecular markers.

The total protein content of whole milk varied from 25 to 27 g/l and was compatible with that indicated by the manufacturers. The infant formulae varied from 1.3 to 5 g/l and malted milks varied from 12 to 16 g/l. In general, the SDS-PAGE patterns revealed 4 distinct groups of milk proteins in all milk powders. The milk proteins were identified as immunoglobulins (>72kD) bovine serum albumin (66 kD), caseins (40-25 kD) and whey proteins (β-lactoglobulin,

α-lactalbumin; 14-18kD). In milk formulae which dissolved poorly, the supernatant contained both β-lactoglobulin and casein while the pellet contained mainly the casein.

The concerntration of the predominant milk protein, casein, varied in whole milk formulae but it was found to be consistently higher than that in infant milk formulae. In contrast, β-lactoglobulin a whey protein known to associate allergy was present in almost equal quantities in both infant and whole milk formulae although a slight variation was observed in the latter. Further, a brand of infant milk formulae was found to contain the lowest concentration of casein but the highest amount of β-lactoglobulin. Malted milk had mainly the casein bands but no β-lactoglobulin or α-lactalbumin.

The present study revealed that although the total protein content in whole milk formulae remained constant the individual protein pattern varied among milk formulae. Further the solubility had a major influence on the protein patterns of different milk formulae.

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