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A COMPARATIVE STUDY ON THE IMMUNOLOGICAL PROPERTIES OF BREAST MILK AND COW'S MILK - II

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ABSTRACT: *This comparative study depicts the levels of immunoglobulins such as IgA and IgG in human breast milk samples with those of cow's milk samples. Immunoglobulins A and G were estimated by the method of Radial Immunodiffusion (RID). Experimental analysis showed that the level of Immunoglobulin A in breast milk samples were found to contain no traces of this antibody. IgG content in cow's milk (16.6 mg/dl) was higher than that of human milk (6.0mg/dl). It is clear that human milk is rich source of IgA, Early exposure through breast feeding is therefore obviously desirable.*

Introduction

Several studies have demonstrated that breast milk composition is unique and best suited for the growing infant. Specific anti-infective factors in breast milk offer protection against infection (1). Immunoglobulin A (IgA), Immunoglobulin G (IgG), Immunodlobulin G (IgG), Immunoglobulin M (IgM), Immunoglobulin D (IgD), Immunoglobulin E (IgE), Complement, Lysozyme, Lactoferrin, Transferrin, Interferons, Leucocytes (Macrophages and Lymphocytes), Lactoperoxidase and Bifidus factor are the important immune factors in human milk, which provide resistance to infant diseases. Only the immunoglobulins and complement act with specificity (2). Of all Immunoglobulins, the need for Immunoglobulin A (IgA) seems most apparent. The infant indeed lacks this immune factor. Exposure to it soon after birth is essential to safeguard against certain bacterial and viral diseases (3).

IgG however is an antibody that crosses to placenta to lend immunity to the infant prior to birth. This is an immune activity that carries on for some few weeks or months. The cow produces IgG in rather large quantities. This antibody promises to function for IgA in the infant formula of the future (4). The aim of the present study is to evaluate the immunological properties of both human and cow's milk.

Materials and Methods

A total of twenty breast milk samples were collected from mothers of moderate socio-economic status, living in Coimbatore. Samples were collected three hours after the

morning feed by complete manual expression of both breasts. Twenty fresh samples of cow's milk were collected for comparison.

Immunoglobulins A and G in milk samples were estimated by the method of radial immune-diffusion using tripartigen plates (5). Tripartigen immunodiffusion plates contain a prepared agargel in which H.chain specific antiserum to the respective immunoglobulin is incorportated. The antiserum is provided by immunization of sheep and goats. Sodium azide (1 mg/ml), sodium P-ethyl mercury, Mercapto benzene and sulfonate (0.1 mg/ml were used as preservatives in the plates. IgA was determined using undiluted milk. Only during IgG determination, the milk was diluted 1:10 with isotonic saline. Wells 1-6 were filled with 5µ litres of human milk samples. The plates were closed tightly and left to sand at room temperature. Evaluation was made after a minimum diffusion time of 50 hours for IgA and IgG. At the end of the given diffusion time, the diameter D of the precipitated rings was measured accurately to 0.1 mm using a calibrated instrument. The immunoglobulin concentrations related to the measured diameters were read directly from the table of reference values. When determinating IgG the value found was multiplied by the dilution factor 10.

Results and Discussion

The mean immunoglobulins values of human and cow's milk are presented in Fig 1.

It is evident from the above figure 1 that mean immunoglobulin A level of human milk is 52.89 mg/dl. The cow's milk found to contain no traces oft is anti body. Of all the immunoglobulins, the IgA seems to be the most important to safeguard against certain bacterial and viral diseases. The IgA level of human colostrom varies considerably. Two investigations put the average at 410 and 457 mg/100g of milk (3). By 3-4 weeks the level has dropped to near 35 mg/100g. To some extent, increased intake of milk on the part of the infant compensates for the lower overall level of IgA. About 80% of IgA in human milk is in

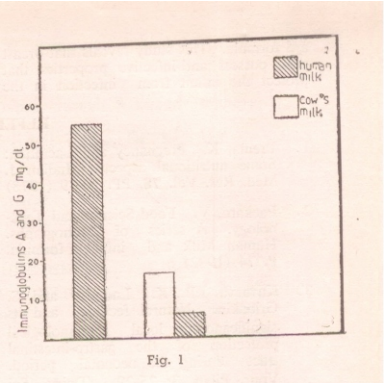

Fig. 1

dimeric form. The infant is unable to produce IgA until 2 months of age. A certain amount of IgA in human milk appears to have some specificity for rota virus (6). Cow's milk on the other hand, carries only traces of this antibody. It is also evident from the above table the immunoglobulin G in cow's milk is higher than in human milk. IgG is an antibody which carries out a variety of functions similar to those of IgA. This antibody patrols and acts as a defence in the intestinal tract. It is known to prevent adhesion (and thereby colonization) of various germs and to bind antigens. Fro this it is clear that in cow's milk IgA appears to be replaced with the closely related.

Packard (1982) reported two classes of cows milk IgG. They are designated IgG_1 and IgG_2. The former makes up 90% of the total. It differs from IgG_2 in its rather larger content of sialic acid. The IgG_1 serves mainly to increase the immune potency of infant formula.

Some generalization can be drawn from the results of this study. The influence of breast milk on the prevention of neonatal infection is increasingly being accepted in scientific circles. Human milk can in no way be replaced or compared with stand and formula. This study reveals that breast milk possess anti-infective properties that protect the infant from infection in the early months. Breast-fed infants are less likely to get colic, infantile allergies and eczema than those fed cow's milk.

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