Malnutrition constitutes one of the major problems in pediatric practice in this country. Various biochemical aspects of this syndrome have been studied by different workers, but data on lipid metabolism are scanty. To assess the changes of lipids in the sera in cases of malnutrition, biochemical investigations on various fractions of serum lipids were carried out.

Material and Methods

Clinical material.—The clinical material comprised six malnourished and six normal children. The age range of both the groups varied from one to three years. Of the six malnourished children one had severe generalised oedema, four had moderate oedema limited only to eye-lids and feet, and one showed signs of marasmus. Except for one patient, all the malnourished children had rough skins. Hair was scanty, lustreless and depigmented in two of the test cases. Body weight of the patients varied from 4 to 6 kilograms. Angular stomatitis was present in three malnourished children. The examination of the stool and the urine did not show anything abnormal.

Collection of samples.—10 c.c. of blood were collected in the morning from each child, from the femoral vein, before any feed was given. Blood samples were then kept at 37° C in an incubator for maximum separation of the serum. Serum was separated and collected for the following investigations: serum lipo-protein, serum cholesterol and its ester. The serum protein fractions and total proteins were estimated on aliquots from the sera of each patient.
Methods.—Total protein and fractions: Markham’s modification of the micro-Kjeldahl method. The different protein fractions were estimated after electrophoretic separation following the methods of Jencks et al.9. Lipo-proteins: Lipo-proteins were fractionated by electrophoresis after pre-staining the serum with acetylated Sudan Black B. The technique of pre-staining of sera eliminated a long and tedious staining procedure including washing. It was found that when acetylated Sudan Black B was used as a stain for the lipo-protein, better results were obtained than when an unacetylated dye was used. The acetylation of Sudan Black B was carried out following the procedure of Lillie and Brutner10. After acetylation, the excess of pyridine and acetic anhydride were removed by repeated washing with distilled water and the acetylated dye was air dried. The serum was prestained with a saturated solution of the acetylated dye in 95% ethanol and in the proportion of 1 c.c. of serum to 0.1 c.c. of dye solution (10 : 1). The alcoholic solution of the dye was added slowly to the serum with continuous shaking to avoid coagulation of the serum. Alcohol was then evaporated from the stained sample of sera in vacuo. The serum sample was subsequently centrifuged to remove any excess of the dye from the sample. The electrophoretic fractionation was carried out on 3 MM Whatman paper by the method of MacDonald and Vemers11. The experimental conditions were (1) veronal acetate buffer; (2) pH—8.6 ionic strength —.05; (3) potential gradient 6 volt/cm. Reasonable separation of the different lipoprotein fractions was obtained between 4 to 5 hours. Both α and β fractions migrated from cathode to anode as a blue zone against the white background of the paper.

Cholesterol and its ester: Cholesterol and its ester were estimated by the method of Schoenheimer and Sperry as modified by Sperry and Webb17.

Results

The values for cholesterol and its ester in the samples of sera from the test and control cases are given in Table 1.

In malnourished children the levels of total cholesterol in the sera varied from 104.2 mg. to 170 mg. per 100 ml. and in those of normal children the variation was from 150.0 mg. to 200 mg. per 100 ml. The variation of free cholesterol in malnourished and healthy children were from 30.0 to 44.2 mg. per 100 ml. and 36.1 to 57.1 mg. per 100 ml. respectively. The level of ester cholesterol in the sera of children suffering from malnutrition varied from 102.2 to 163.9 mg. per 100 ml. The ratio between the ester to total cholesterol in malnourished children was found to be between 0.57 to 0.82 and in the healthy children from 0.68 to 0.81.

These data showed that the total and free cholesterol and cholesterol ester levels in the sera were less in patients suffering from malnutrition than those of normal children. But the ratio of ester to total cholesterol was found to have almost similar values in both the groups.