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Biochemical Predictors of Mortality in Protein Energy Malnutrition

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Protein energy malnutrition (PEM) causes significant morbidity and mortality. Low serum albumin level has been reported to predict mortality(1). However, now-a-days since marasmus and undernutrition cases with normal serum albumin levels are more common(2), an attempt has been made to look into other probable predictors of mortality.

Material and Methods

One hundred and thirty six consecutive cases of PEM in the age group 1-24 months admitted to SAT Hospital, Medical College, Thiruvananthapuram were included in the study. Children with congenital anomalies, genetic and metabolic disorders, CNS infection and post measles cases were excluded from the study and also all the deaths due to other obvious infections. The anthropometric parameters were compared to NCHS standards. The biochemical parameters like serum protein, albumin, total lipids, total cholesterol and phospholipid levels were estimated using appropriately standardized techniques(3-7) and were compared to control values established using 25 blood samples collected from well nourished children belonging to the same age group. The mean age in the study was 15.3 ± 7.3 months and in the control it was 13.9 ± 7.4 months.

Results

Clinically 47 (35%) had marasmus, 10 (7%) had marasmic kwashiorkor, 6 (4%) had kwashiorkor and 73 (54%) had under nutrition. The mortality during the hospital stay was 11 (8%) and 8 (73%) of the deaths in those with severe PEM (weight <60%).

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TABLE I–*Various Biochemical Parameters in the Study*

Parameters	Study (Mean ± SD)	Control (Mean ± SD)
Serum protein (g/dl)	6.02 ± 1.0	7.06 ± 0.6
Serum albumin (g/dl)	3.4 ± 0.79	4.16 ± 0.34
Serum total lipids (mg/dl)	594.05 ± 190.21	523.80 ± 74.26
Serum cholesterol (mg/dl)	196.22 ± 62.71	185.27 ± 26.29
Serum phospholipid (mg/dl)	116.65 ± 56.64	153.46 ± 28.88

TABLE II–*Relationship Between Serum Albumin and Mortality*

S. albumin (g/dl)	No. of cases	Mortality	
		n	(%)
>3	106	2	(2)
2–3	26	7	(27)
<2	4	2	(50)

TABLE III–*Association Between Serum Lipids and Mortality*

Parameter	Survivors		Mortality		Chi-Square value
	No	(5)	No	(%)	
Serum total lipid Normal (400-700 mg/dl)	115	(96.6)	4	(3.4)	20
Below normal (< 400 mg/dl)	10	(58.8)	7	(41.2)	p<0.01
Serum phospholipid Normal (100-295 mg/dl)	87	(96.7)	3	(3.3)	6.5
Below normal (<100 mg/dl)	38	(82.6)	8	(17.4)	p<0.05

The various biochemical parameters are given in *Table I.* Progressive increase in mortality was observed with a progressive reduction in serum albumin level (*Table II*). In those with serum total lipids and phospholipid levels below the normal range, the mortality was increased. On analysis with the Chi-square test for association, this observation was statistically significant at 1 and 5% level, respectively (*Table III*). No such association was noted with serum cholesterol levels.

Discussion

Even though serum albumin level is a good predictor of mortality, these days since frank Kwashiorkor cases with low serum albumin levels are becoming rare(1), it is not applicable in the majority of the cases of PEM. While considering serum lipids, an inverse relationship has been documented between the various serum lipid levels and fatty liver(8). The statistically significant increase in mortality noted in those with low serum total lipid and phospholipid levels is of clinical importance. Hence, we suggest that low serum total lipid and phospholipid levels may be regarded as probable predictors of mortality.

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Hydranencephaly/Multicystic Encephalomalacia: Association with Congenital Rubella Infection

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Hydranencephaly, defined as congenital absence of cerebral hemispheres, is a

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