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Malnutrition - Hepatic Function and Liv.52 Therapy

Khetarpal, S.K.*, *B.Sc. M.D., D.C.H.*, Assistant Professor,
Leela Ramakumar, *F.R.C.P., D.C.H.*, Professor
and
Ramlubhaya, *M.B.B.S.*, Research Assistant,
From Department of Paediatrics, Medical College, Patiala.

(* Present address: Professor of Paediatrics (Additional), Medical College, Amritsar)

Malnutrition forms an important group and is a major problem in medical practice in India and other tropical countries.

The liver is the key organ and holds a significant controlling position with numerous metabolic processes and is actively concerned with the synthesis of plasma proteins, metabolism of proteins, fats, carbohydrates, minerals and water and storage of vitamins and minerals. It helps haemopoiesis in intrauterine life.

Many systemic illnesses like malnutrition, toxaemias, hereditary diseases and toxic action of drugs predispose the liver to metabolic malfunction. Malnutrition has been reported to bring about structural and functional changes in the liver by various field workers.

Liver is enlarged, soft and smooth due to fatty changes. Liver biopsy shows marked increase in cholesterol and reduction in the number of demonstrable particles of nucleoproteins and variable fatty metamorphosis. Liver function tests do not show a definite correlation though variable abnormal finding are reported by various authors.

In spite of tremendous strides in modern medicine there has been no drug that stimulates the function of the liver, protects it from damage or helps in the regeneration of hepatic cells. Liv.52 is reported to be a powerful hepatic stimulant and choleretic which increases the functional capacity of the liver and accelerates cellular metabolic activity and promotes regeneration and shows marked lipotropic activity. It has been extensively reported to bring about marked improvement in appetite, gain in body weight and a feeling of well-being, stimulating normal haemopoieses and encouraging normal growth in children.

Liv.52 has been reported to keep the liver functioning at its optimum in both experimental and clinical studies. Experiments on rats and other laboratory animals have shown increased food intake, better assimilation and utilisation of food and a significant gain in weight when on Liv.52 therapy (Kale *et al*. 1966). The anabolic effect of Liv.52 has also been shown in man by many workers (Damle and Deshpande, 1966, Sheth *et al*., 1963; Athavale, 1966; Mukherjee, 1969 and Mathur, 1969). Many of these authors have reported improvement of appetite and gain in weight in children with sub-optimum weights. The anabolic effect of Liv.52 in malnutrition has been reported by Sheth *et al*. 1963, and Damle and Deshpande, 1966, and Prasad *et al*., 1969. It has been reported to be effective anorexia of varying causes including malnutrition by Sheth *et al*. (1963), Athavale (1966), Saxena (1971), Indira Bai (1970), Mukherjee (1969), Prasad (1969) and Dayal (1970). Liv.52 is made from indigenous drug plants that have protective and regenerative effect on the hepatic parenchyma.

[Joglekar *et al*. (1963), Karandikar *et al*. (1963), Patel and Sadre (1963) Sheth *et al*. (1969).]

Liv.52 contains the following ingredients: Capparis spinosa, Cichorium intybus, Solanum nigrum, Cassia occidentalis, Terminalia arjuna, Achillea millefolium, Tamarix gallica and Mandur bhasma prepared in the juices and decoctions of various hepatic stimulants.

MATERIAL AND METHODS

The present study was undertaken at the Department of Paediatrics, Rajendra Hospital, Patiala, to assess critically the role of Liv.52 on improvement in anorexia, establishment of positive nitrogen balance and gain in weight in cases of simple protein-calorie malnutrition of dietetic origin. Matching controls of identical age and severity of malnutrition were used for purposes of comparison. The study was carried out over a period of one and a half years. Fifty-seven children were studied, but 22 were excluded from the study as they left the hospital before the detailed studies were completed. All these cases were admitted, followed up and studied in the paediatric wards of the Rajendra Hospital, Patiala.

In the present series 35 cases of simple protein-calorie malnutrition were studied. Out of these, 15 cases of identical age and severity served as a control. Diet in the two groups of cases was similar in quantity and composition. Infants received milk, egg, semi-solids, protein supplements and vitamins; while other children, in addition, received bread, vegetables, pulses and meat preparations. Protein supplements were given in the daily dose of 7.5 gm. in children over one year in three to four divided doses in all cases.

Detailed clinical examination to exclude the existence of any organic or specific disease and important laboratory investigations like fasting, blood sugar, blood urea estimation, tuberculin tests, erythrocyte sedimentation rate and X-ray chest were done in all the cases before the start of estimation of total and differential serum proteins were also carried out in all cases. Liv.52 drops were given in 20 cases in a dose of 5 to 10 drops three times a day during infancy and 10 - 20 drops three times a day in older children all along.

The cases were assessed on alternate days during the period of study. The assessment included dietetic intake weight gain, improvement of appetite, disappearance of oedema and improvement of anaemia. The child, without clothes, was weighed in the same weighing machine at almost the same time of the day. Serum protein studies and haemoglobin estimations were carried out after 4 weeks, 6 weeks and 8 weeks of treatment. A few cases in each group were treated with antibiotics and other symptomatic therapy whenever indicated.

Table I: Showing age and sex distribution in study and control groups

Age	Liv.52 group			Control group		Total
	Male	Female	Total	Male	Female	
Upto 1 year	7	3	10	1	7	8
1 to 2 years	3	2	5	3	-	3
2 to 3 years	3	1	4	1	1	2
Over 3 years	-	1	1	1	1	2
Total	13	7	20	6	9	15

The results were recorded with special reference to (a) anorexia (b) weight gain and a general feeling of well-being and (c) the response to the laboratory studies in serum proteins and blood haemoglobin levels at intervals of 4 weeks, 6 weeks and later on. The patients were also watched for untoward or toxic effects or side reactions.

Anorexia: Improvement of appetite was marked in all the cases undertaken for study and Table II shows the case-wise disappearance of anorexia after initiation of therapy in the Liv.52 and control groups.

Table II: Response in anorexia within six days of therapy		
No. of days	Liv.52 group (20 cases)	Control group (15 cases)
3	2	1
4	7	2
5	3	2
6	6	4
Total	18	9

The anorexia disappeared earlier in the Liv.52 group (average 5.25 days) than in the control group (average 7 days).

The anorexia disappeared in much shorter time and also within 6 days in 18 cases (90%) in Liv.52 group compared to the control group 9 cases (60%).

Weight gain: The gain in weight was more in 13 cases in the Liv.52 group (72.2%) as compared to the five cases of the control group 27.8%. The weight gain in relation to initial weight was also compared in the two categories of the subjects. Weight gain percentage was greater in 12 Liv.52 cases (66.67%) as compared to the corresponding 6 control cases 33.33%. Table III shows comparison of weight gain categories at the end of 4 and 6 weeks. At the 6 weeks of study 11 out of 16 cases of Liv.52 group 68.75% had more gain in weight than the corresponding control cases whereas at the end of 6 weeks of study the Liv.52 group of cases had greater gain in weight 81.25%.
Serum Proteins: Serum protein determination, total as well as the albumin/globulin ratio were performed at 4 weeks, 6 weeks and 8 weeks of study. Table IV shows the initial results and at the end of 6 weeks in total serum proteins and in albumin in the Liv.52 group and control group. The table has been simplified for presentation and ready reference. At 6 weeks of study the rise in total serum protein level was evident in all cases of study except in two cases, the rise being much more significant and clear cut in the Liv.52 group. The two cases of Liv.52 group which showed a fall in total protein however showed a rise in serum albumin and there was no evidence of infection or oedema. Seven cases showed rise in serum albumin values and a weight gain ranging from 8.14% to 25%. There was greater increase in total serum protein values in 10 Liv.52 cases 71.43% out of 14 cases than the corresponding control cases at 4 weeks of study. After 6 weeks of study the simultaneous comparison showed greater increase in 8 Liv.52 cases (80%) out of 10. Serum albumin increase was much greater in Liv.52 group at 4 and 6 weeks of study.

Haemoglobin: The increase in haemoglobin content was greater in 7 Liv.52 cases than the corresponding control cases probably due to improved appetite and better metabolism and haemoglobin synthesis consequent on improved hepatic function and iron metabolism.

Table III: Showing weight gain in kilograms				
Sl.No.	Age in years	Initial wt. in kg	Weight gain Actual in Kg & (Gain Percentage)	
			4 weeks after study	6 weeks after study
Liv.52 CATEGORY				
1.	2½ /12	5.400	0.550 (10.2%)	-
2.	5/12	4.850	0.250 (5.1%)	0.950 (19.60%)
3.	7/12	5.640	0.510 (9.00%)	0.660 (11.70%)
4.	8/12	6.100	0.600 (9.8%)	1.200 (19.67%)
5.	8/12	6.400	0.950 (14.8%)	1.520 (23.75%)
6.	9/12	3.000	0.800 (26.7%)	1.250 (41.67%)
7.	9/12	4.300	1.200 (27.9%)	1.950 (45.35%)
8.	11/12	3.360	0.940 (28.00%)	-
9.	1	4.400	0.500 (11.4%)	1.550 (35.23%)
10.	1	6.350	0.850 (13.4%)	1.600 (25.20%)
11.	1¼	6.000	0.650 (10.8%)	-
12.	1¼	5.330	0.470 (8.8%)	-
13.	1½	6.240	1.460 8.8%)	*1.610 (25.80%)
14.	2	6.900	1.300 (18.8%)	-
15.	2	5.780	0.280 (4.8%)	0.720 (12.46%)
16.	2½	7.500	0.980 (13.00%)	-
17.	2½	7.750	0.650 (8.4%)	1.250 (16.13%)
18.	2-5/6	7.900	—	1.500 (19.99%)
19.	3	5.400	1.450 (26.9%)	2.100 (38.89%)
20.	5	9.160	2.790 (30.5%)	4.240 (26.29%)
CONTROL CATEGORY				
1.	2/12	2.880	0.220 (7.6%)	—
2.	7/12	5.200	0.260 (5.00%)	0.400 (7.69%)
3.	8/12	4.800	0.800 (16.7%)	
4.	8½/12	4.900	0.940 (19.2%)	—
5.	9/12	3.300	1.020 (30.9%)	—
6.	9/12	5.400	0.500 (9.3%)	0.800 (14.81%)
7.	9/12	2.650	0.900 (34.00%)	1.270 (47.92%)
8.	1	4.300	0.350 (8.1%)	0.400 (9.30%)
9.	1	5.850	0.470 (8.00%)	0.650 (11.11%)
10.	1½	7.000	-	* 1.100 (15.71%)
11.	2	8.750	0.750 (8.6%)	-
12.	2½	8.000	1.800 (22.5%)	-
13.	3	6.350	0.950 (15.00%)	* 1.000 (15.75%)
14.	3½	6.630	0.290 (4.4%)	0.370 (5.58%)
15.	9	11.250	1.550 (13.8%)	2.050 (18.22%)
Note: - * Indicates the weight gain at 5 weeks of therapy.				

Table IV: Total serum proteins and serum albumin studies				
Sl.No.	Age in years	Initial		Total serum protein in gms% gain (Percentage) 6 weeks after study
LIV.52 CATEGORY				
1.	2½/12	4.6		-
2.	5/12	5.5		Nil (Nil)
3.	7/12	6.0	*-	0.7 (-11.67%)
4.	8/12	3.7		1.6 (43.24%)
5.	8/12	4.5		1.0 (22.22%)
6.	9/12	4.5		0.7 (15.55%)
7.	9/12	4.3		0.9 (20.93%)
8.	11/12	5.8		-
9.	1	5.8		0.2 (3.45%)
10.	1	5.3	*-	1.0 (-18.87%)
11.	1¼	5.8		-
12.	1¼	5.1		-
13.	1½	5.8		-
14.	2	4.5		-
15.	2	5.3		1.1 (20.75%)
16.	2½	6.3		-
17.	2½	4.3		0.2 (4.65%)
18.	2-5/6	5.5		0.3 (5.45%)
19.	3	4.3		1.9 (44.19%)
20.	5	4.6		-
CONTROL CATEGORY				
1.	2/12	6.5		-
2.	7/12	5.2		0.1 (1.92%)
3.	8/12	4.5		-
4.	8½/12	5.8		-
5.	9/12	4.5		-
6.	9/12	5.6		0.7 (12.50%)
7.	9/12	5.8		Nil (Nil)
8.	1	6.0		0.7 (11.67%)
9.	1	5.3		1.0 (18.87%)
10.	1½	5.5		Nil (Nil)
11.	2	5.3		-
12.	2½	6.0		-
13.	3	5.0		-
14.	3½	5.0		-
15.	9	5.3		1.2 (22.64%)
Note: -* Indicates the fall in total serum protein in gms%.				

Table V	
Initial	Serum Albumin in gms%
	Gain (Percentage)
	6 weeks after study
Liv.52 CATEGORY	
2.5	-
2.0	0.5 (25.00%)
2.1	0.7 (33.33%)
2.1	0.7 (33.33%)
2.1	1.0 (47.62%)
1.5	0.7 (46.67%)
1.9	0.7 (36.84%)
2.2	-
2.6	0.7 (26.92%)
2.0	0.5 (25.00%)
2.6	-
3.0	-
2.1	-
1.9	-
2.2	1.0 (45.45%)
3.2	-
2.0	0.8 (40.00%)
2.5	0.9 (36.00%)
2.1	0.9 (42.86%)
1.5	-
CONTROL CATEGORY	
3.7	-
3.2	0.3 (9.38%)
2.1	-
2.4	-
2.1	-
2.3	0.9 (39.13%)
2.2	1.0 (45.45%)
2.5	1.8 (72.00%)
2.4	0.8 (33.33%)
2.0	0.5 (25.00%)
2.6	-
3.0	-
2.3	-
2.0	-
2.1	0.9 (42.86%)

DISCUSSION

Malnutrition is a predominant clinical finding in paediatric practice in India. Several factors are responsible for the same. Therapy of malnutrition is well documented. Liv.52 can be tried as an adjunct to the usual treatment as it has been reported to have an effect as an anabolic agent and for improvement of liver function with consequent salutary effect on metabolic processes. The therapeutic results could be well studied and compared directly with control cases. Improvement in appetite and consequent increase in weight would indicate than Liv.52 is an effective and useful adjunct in the management of malnutrition. Anorexia as a cause and effect of malnutrition has been well recognised. Most children of simple protein-calorie malnutrition have varying degree of sub-optimum weight, delayed growth and development and anorexia. Kale *et al*. (1966) have shown significant gain in weight in 54 albino rats especially during 3rd and 4th weeks of administration as compared with the control group. Kulkarni *et al*. (1971) observed 23 adult female rats and showed that Liv.52 by its anabolic activity counteracts the effect of Prednisolone as efficiently as the anabolic steroids.

Srinivasan and Balwani (1968) have shown increased food consumption and more efficient utilisation of Liv.52. Sheth *et al*. have shown that Liv.52 has salutary effect in cases of anorexia of varied etiology. Athavale, Mukherjee, Indira Bai, Saxena, S., Dayal, R.S. *et al*. and Sesha Chari, K.S. have all reported on favourable results of Liv.52 in cases of anorexia.

Prasad, Lala S. *et al*. have reported of its value in cases of malnutrition as an adjunct in its management. Dayal *et al*. have reported improvement in the histopathological picture in the form of repletion of cytoplasmic proteins and diminution of fatty infiltration in some of them. These changes may be responsible for the findings of plasma proteins and serum albumin in the present series. All the workers have attributed the results to the effects of Liv.52 on liver function.

In the present study, anorexia associated with simple malnutrition improved earlier with Liv.52 therapy in 72.2% cases as compared to identical age control cases. Sheth *et al*. presumed that the action of the drug on the liver functions may be responsible for its use in anorexia but the exact mechanism of action needs further study. Absolute gain in weight was greater in 72.2% cases as compared to identical control cases in this series.

Our results of improvement in anorexia and absolute gain in weight with Liv.52 therapy are in agreement with those of Athavale (1966), Damle and Deshpande (1966). The gain in weight at 5 to 6 weeks of the present study was also more in Liv.52 cases as compared to the controls at similar periods of study. The absolute weight gain and the weight gain percentage showed a direct co-relation at different periods of study.

Total serum protein values showed increase. The serum albumin values in these cases showed increase in all instances along with the gain in weight and improved appetite. The levels of serum albumin has been considered as an index of nutritional status of the child. Serum albumin increase has been greater in Liv.52 cases, probably due to more production of albumin in the liver.

The present study shows increase in body weight, improvement in anorexia, increase in total serum proteins and the increase in the absolute level of serum albumin with Liv.52 therapy when compared with a matching control group.

SUMMARY

1. A study with identical controls on effects of Liv.52 was conducted in 35 cases at the Department of Paediatrics, Patiala Medical College, Patiala.

2. There was marked improvement of appetite and weight gain in 72.2% cases on Liv.52 therapy as compared with the control group.

3. All the cases in Liv.52 group showed rise in total serum proteins at the end of 4 and 6 weeks of study except two which nevertheless showed a rise in serum albumin.

4. Serum albumin rise, considered as an index of nutritional status, was higher in the Liv.52 group both at the end of 4 and 6 weeks of study.

5. Increase in haemoglobin % was greater (35%) in the Liv.52 group compared to control group.

6. There were no untoward or toxic effects with Liv.52 therapy.

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