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The Effect of Liv.52 on the Pattern of weight-gain in Children with Marasmus and Other Degrees of Malnutrition as compared with that of Non-Virilising Androgens

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INTRODUCTION

In a child, appetite is one of the raw drives that promotes the intake of proper nutrition. Anorexia is a common complaint from parents regarding the child at various phases of its growth. Well-marked appetite, in contrast, is also a phenomenon of the growing age period. A critical phase of growth for the child in the tropics occurs in the first five years of its life, as during this phase of growth the child is exposed to many infections, negative food habits and social customs governing its upbringing. Because of these factors the morbidity and mortality rates are high in this age group. Anorexia is amongst the commonest symptoms from which the child suffers and of which parents complain. Consequently, every paediatrician and general practitioner is called upon to promote a healthy and physiological appetite, through some simple medium without recourse to extraordinary drugging. It is customary to prescribe some multivitamin tonics or enzymatic preparations to meet this need.

However, some rethinking is necessary regarding the methodology we adopt. The drugs we choose to promote proper appetite in this age period must have the least injurious effects on the system.

The problem of stimulating proper appetite and digestion in the marasmic and moderately debilitated child has engaged the serious attention of many clinicians. Anabolic steroids have been claimed to offer some advantages in this direction due to their nitrogen retaining properties and consequent improvement of body weight. The mechanism of action of anabolic steroids is of a complicated nature.

The liver with its multifaceted action of promoting various enzymatic activities is the most important organ controlling the complex mechanism of appetite and growth. It is, therefore, worth considering a liver stimulant whilst looking for a solution to this problem. Innumerable substitute therapies affecting the liver have been suggested. We have generally used total or refined liver extracts and also vitamin B_{12} as growth promoting factors.

On experimental animals broad-spectrum antibiotics like achromycin are also used to promote growth, but we cannot use these in human subjects lest we develop drug resistance or superimposed fungal infections.

Therefore, we have been induced to take up for study Liv.52, a herbal preparation containing extracts of various plants. Liv.52 is claimed to have a cholerectic and stimulatory action on the liver which brings to the optimal level the complicated functional mechanism of the liver and thus revives appetite and promotes growth of the debilitated child. In this study we have observed the effect of Liv.52 on promoting appetite which paves the way for a better growth pattern as a result of improved nutritional intake and utilisation.

COMPOSITION AND PROPERTIES OF Liv.52

1. Capparis spinosa (Hindi: Kabra, Telugu: Enugadanta)
2. Cichorium intybus (Hindi: Kasni, Telugu: Kasinivittulu)
3. Solanum nigrum (Hindi: Makoi, Telugu: Kamanchi Chettu)
4. Cassia occidentalis (Hindi: Kasondi, Telugu: Kasinda)
5. Terminalia arjuna (Hindi: Arjun, Telugu: Tellamadio)
6. Achillea millefolium (Hindi: Gandana)
7. Tamarix gallica (Hindi: Jhau, Telugu: Erusarumanu).

Properties of the drugs enumerated here are according to the *Indian Materia Medica* by Dr. Nadkarni, and are as follows:

Capparis spinosa
It is used in loss of appetite and scurvy.

Cassia occidentalis
It is used to relieve spasm and is also useful in relieving the flatulence of the dyspeptic.

Cichorium intybus
It is useful in obstructions or torpor of liver and in checking bilious enlargement of spleen with general dropsy. Flowers made into sherbet are given in liver disorder.

Solanum nigrum
It is useful in inflammatory swelling and chronic cirrhosis of the liver and affections of the spleen.

Tamarix gallica
It is a mild laxative as it causes soft motions without irritation to bowels. It has a sweet taste and so is suitable for children.

Terminalia arjuna
Nothing relevant has been mentioned in the above text.

In addition to the extracts of the above plants, Liv.52 also contains *Mandur bhasma* (Iron salts).

MATERIAL AND METHODS

Children of various age groups of lower economic strata who are generally admitted into our wards were taken in this study. Children who were slightly marasmic with various degrees of malnutrition and lack of growth, with the predominant symptom of anorexia, were studied. Any minor ailments were treated. A balanced diet containing milk, 1 egg, 1 plantain and other additional carbohydrate foods to make up calories was given, as per the caloric requirements of the child's present and expected body weight. The rate of calories per pound of body weight ranged between 50-70 calories. The child's capacity to digest the diet was taken into consideration in increasing the daily requirements under proper supervision. Steady weight gain was taken as the primary indication to assume the adequacy of calories in a particular case.

Many of these children were observed from 20 to 105 days with an average of 40 days. A few cases which were studied for a short duration, though shown in the table, are mentioned only for

observation. Some cases who absconded were persuaded to return, after tracing their address, and observed for some more periods.

METHODS OF TREATMENT ADOPTED

A comparative study of Liv.52 and an anabolic steroid (Orabolin) with a control group kept purely on diet and general vitamins was conducted. The groups were divided as follows:

1. With Liv.52 + Diet
2. Orabolin + Diet
3. Liv.52 + Orabolin + Diet (very few)
4. Diet + Vitamin (Control)

RESULTS

Table 1 gives the number of cases, age groups observed in relation to number of days, initial weight, final weight, percentage weight gain, period of study, therapy adopted and relevant remarks.

Table 1

Case No.	Name	Age	Initial wt.	Final wt.	% Wt. gain	Period of stay	Therapy adopted	Remarks
(1)	Khaja Pasha	2 years 10 months	14½ lb.	16¼ lb.	14%	30 days	Liv.52 + Diet + Vitamins 1100 Cal/Day	
(2)	Martin	1½ years	16 lb.	18 lb.	12.5%	30 days	Orabolin + Diet + Vitamins 1100 Cal/Day	
(3)	Prasad Rao	1½ years	14¾ lb.	16 lb.	8.3%	30 days	Liv.52 + Diet + Vitamins 1100 Cal/Day	
(4)	Sudhakar	6 months	7½ lb.	11¼ lb.	50%	40 days	Liv.52 + Diet + Vitamins 780 Cal/Day	
(5)	Rahana	1 month	4¼ lb.	5½ lb.				On 17th April, discharged Wt. 5¼
				7¾ lb.	53%	105 days	Liv.52+Diet + Vitamins 780 Cal/Day	On 14/7 readmitted Wt. 7¾
(6)	Anuradha	2 years 3½ months	13¾ lb.	14¼ lb.	3%	7 days	Liv.52+Diet+ Vitamins 1100 Cal/Day	
(7)	Sayed	1 year 8 months	10¾ lb.	11¾ lb.	9%	10 days	Liv.52+Diet+ Vitamins 780 Cal/Day	
(8)	Gousumea	11 months	8¼ lb.	12 lb.	45%	50 days	Liv.52+Diet+ Vitamins 1100 Cal/Day	
(9)	Ramchander	6 years	19½ lb.	29¾ lb.	50%	70 days	Liv.52+Diet+ Vitamins 1100 Cal/Day	
(10)	Sudarshan	3 years	12 lb.	17 lb.	41.6%	50 days	Orabolin + Diet + Vitamins 1100 Cal/Day	
(11)	Savitri	5 years 2 months	15¼ lb.	23 lb.	53%	40 days	Orabolin + Diet + Vitamins 1100 Cal/Day	
(12)	Amjad	4 months 22 days	6¾ lb.	10 lb.	39%	50 days	Liv.52 + Diet + Vitamins 780 Cal/Day	
(13)	Balamani	6 months 20 days	6½ lb.	8½ lb.	36%	40 days	Diet + Vitamins 780 Cal/Day	
(14)	Bagya Laxmi	2 years 1 month	11¾ lb.	14 lb.	26%	30 days	Diet + Liv.52 1100 Cal/Day	
(15)	Bala Narsiah	4 years	19 lb.	21 lb.	10.5%	24 days	Diet + Liv.52 1100 Cal/Day	
(16)	Anjamma	1 year 7 months	12¾ lb.	16 lb.	25%	35 days	Liv.52 + Orabolin + Diet 1100 Cal/Day	
(17)	Nasir Pasha	8 months 20 days	10¾ lb.	14½ lb.	34%	50 days	Diet + Orabolin 780 Cal/Day	
(18)	Iqbal Pasha	5 months 10 days	7¾ lb.	9¾ lb.	25%	30 days	Orabolin + Diet 780 Cal/Day	
(19)	Attamma	4 years	14 lb.	18¾ lb.	35%	60 days	Liv.52 + ISONEX + Diet 780 Cal/Day	

(20)	Sherkhan	1½ years	11¼ lb.	13¼ lb.	15%	35 days	Orabolin + Diet + Vitamins 780 Cal/Day	
(21)	Pasha	3 months	5¾ lb.	7 lb.	21%	40 days	Orabolin + diet + Vitamins 780 Cal/Day	

Table II gives comparative percentage weight gain with Liv.52 and Orabolin. The number of pure diet cases alone are minimal and not of statistical significance.

Table II: Comparative percentage weight gain with Liv.52 & Orabolin	
Liv.52	Orabolin
14%	12.5%
50%	41.6%
25%	53%
45%	34%
50%	25%
39%	15%
26%	21%
10.5%	
35%	
Average: 32.8%	29%

DISCUSSION

An attempt to determine the role of Liv.52 as an anabolic agent provokes one to have review of the study of physiological functions of the liver. The four basic functions of the liver are:

1. Protein synthesis
2. Transmethylation
3. Transamination
4. Detoxication

The biochemical processes leading to protein synthesis are very poorly understood. But what we can assume is that if the body tissues are given the necessary aminoacids, they can link them and so synthesise proteins. The liver is the chief factory where this particular phenomenon is observed.

The liver, by virtue of its basic metabolic functions — one of which is anabolism – is capable of considerably increasing the protein contents of the tissues.

Keeping in view the functions, we can presume that most probably Liv.52 must be helping the liver in carrying out these four basic functions much more effectively and normally, with the result that the protein synthesis and storage activity of the liver are also enhanced and result in increased nitrogen balance as seen in this study.

Table III: Age distribution	
Age	Number
Up to 6 months	6
6 months to 1 year	3
1 – 1½ years	2
1½ – 2 years	2
2 – 2½ years	2
2½ – 3 years	2
3 – 6 years	4
Total	21

Table III shows that out of 21 cases 17, i.e., 81 per cent of the cases under study with a random selection, belong to the age group from birth to 3 years where the incidence of malnutrition is maximum. Children between 3-6 years formed only 25 per cent of the cases. From birth to 3 years is also the age period when both nutritional oedema, marasmus and `Indian childhood cirrhosis' of the liver have the maximum incidence. Though it has been shown by close study that Kwashiorkor does not develop into cirrhosis of the liver, strangely the maximum incidence of 'Indian childhood cirrhosis' also falls into this age group. Kwashiorkor *per se* does not lead to 'Indian childhood cirrhosis' but occurs mostly in the poorer sections of our community. It is due to bad upbringing, habits and also to the feeding habits of children in all developing countries. Thus marked nutritional deficiencies could be rectified with proper parental education on infant nutrition.

Indian childhood cirrhosis is confined to the better nourished group of society irrespective of economic status and better nutritional habits. Sometimes it is observed in the same family and in siblings; hence it is observed that there is familial tendency and also males are prone to have greater incidence of this usually fatal disorder in the early pediatric age group (6 months to 5 years).

The present study on the effects of Liv.52 on malnourished children, who generally have a tendency for a fatty, inert liver functionally, has demonstrated that cases on Liv.52 have shown good response by way of weight gain reflecting the positive nitrogen balance during the period of treatment. Anabolic steroids have experimentally been proved to promote or result in a positive nitrogen balance as revealed in various studies. The same effect has been experimentally demonstrated by Kulkarni and Joglekar (1970) with Liv.52. In our study, Liv.52 has shown the same effect, clinically, as the anabolic steroids.

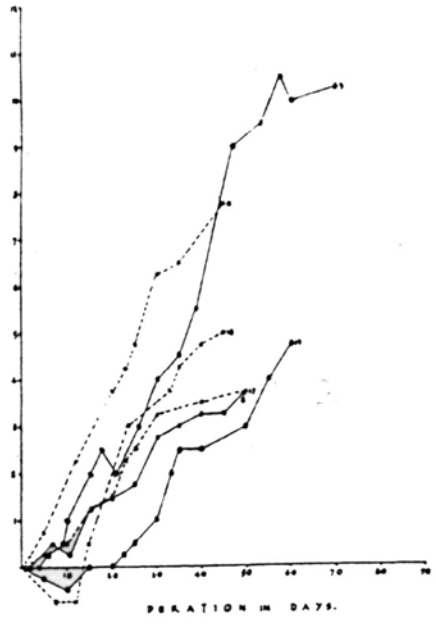

FIGURE 1.

(1) O———O lines represent the growth pattern with Liv.52
(2) - - - - - lines represent the pattern of weight gain of children with non-virilizing Androgens (Orabolin)

It is a common observation in children similar to those selected for this study, that they do not have a good appetite and are averse to food. This is the main handicap in promoting better intake of calories. Hence, initial medication of some sort to get over the handicap is essential. In this respect Liv.52 has a definite role in getting over the initial anorexia and restoring the complex mechanism by stimulation of the liver to function in a demonstrable manner as evidenced by the improvement in the clinical signs.

The study has shown that Liv.52 has a similar effect in producing positive nitrogen balance as the anabolic steroids. This is shown in the comparative growth chart (*Fig. 1).*

The *Indian Materia Medica* by Nadkarni establishes the positive pharmacological actions of the herbs used in this compound, Liv.52. It is heartening to note that the action of these herbs could give the same effect as the hormones without their proverbial virilising and other unwelcome side-effects.

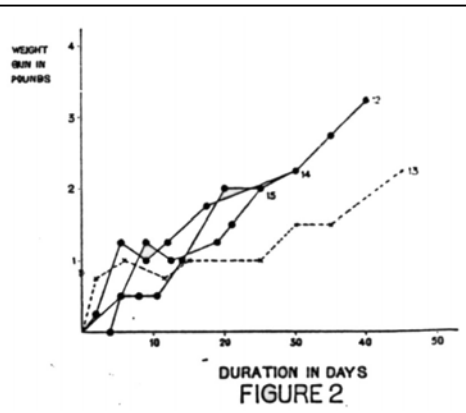

FIGURE 2

O———O lines represent the growth pattern of weight gain with Liv.52
"X- - - - -X" line represents the pattern of weight gain with diet and vitamins (control) (Case No. 13)

It could be argued that weight gain could be obtained by simple balanced diet if given in a modified form as pre-digested foods with the possibility of better absorption. *Fig. 2* represents the growth pattern.

Case 13 who was maintained purely on diet vitamins is compared with Case Nos. 12, 14 and 15 (who were receiving in addition Liv.52) in comparative growth charts. This shows the marked deviation from the rate of growth and the total growth obtained by the other 3 children (12, 14 and 15) who were having in addition, Liv.2. Though diet could give some gain in weight, it is distinctly and significantly lagging behind in its performance. This shows the additional specific function of Liv.52 as discussed in the study (Fig.2).

The graphs clearly show the marked superiority in the growth pattern as well as in the total growth of these children on Liv.52 as compared to the control on diet alone. It is true that improved diet does bring about gain in the weight of malnourished children but this gain is distinctly and significantly lower than when Liv.52 is added to the regimen. This, no doubt, is due to the specific function of Liv.52.

As observed earlier, the incidence of liver disorders in children is maximum in the birth to 3 years' age group. If Liv.52 is given prophylactically in cases where a familial tendency towards cirrhosis is observed, Liv.52 may prevent this fatal disorder. This need not be treated as a wild guess. Experimentation in mice has shown that damage to the liver due to toxic agents could be reversed in some and could be prevented in other groups in spite of toxic injury.

Thus, we may continue further study in the preventive aspects of cirrhosis of liver in siblings where there is already a familial tendency. Even in this study Liv.52 has established a positive nitrogen balance by improving the liver functions through complicated channels. It has produced a better response and added to the cheerfulness and well-being of the child in all cases where there was a simple nutritional deficiency of a minor or major degree.

The administration of this drug, Liv.52, in anticipated cases of `Indian childhood cirrhosis' may be able to prevent the incidence or mitigate the progress of this disorder. Nature may thus get a chance to restore the functions of the liver to a survival margin over a prolonged period. Later, hormonal and individual factors may restore that degree of liver function necessary to get over the crisis and restore the person to normality. It is well-known fact that even if 80 per cent of the liver is damaged it is capable of regeneration, and of providing the necessary enzymatic action of the human system, and helping a person to survive in comfort. Thus an infant benefits in two ways from Liv.52 therapy:

(i) Increased absorption and assimilation of food and consequent positive nitrogen balance.
(ii) Prevention and recovery from liver injury which may progress to gross hepatic dysfunction or to 'Indian childhood cirrhosis' if left untreated, and may end fatally.

SUMMARY AND CONCLUSIONS

(1) A study of the effect of Liv.52 on children with various degrees of malnutrition was undertaken in 21 cases. For comparison the effect of Orabolin with diet, and diet with vitamins was studied in a few cases (Tables I and II).

(2) The weight gain in all these cases, and the percentage weight gain is noted. The period of observation ranged from 30 to 50 days (Figs. 1 and 2).

(3) The maximum number of children, i.e. 17, were in the birth to 3 years age group. 19 per cent of the cases were in the 5 to 6 years age group (Table II).

(4) The weight gain on Liv.52 in addition to balanced diet, both in content and calories, was comparable to the weight gain obtained on the anabolic steroid plus a similar diet. This shows that Liv.52, a preparation containing various extract of herbs, has a similar action in producing a positive nitrogen balance as the anabolic steroids usually given to promote better growth and development in marasmic children. There were no side effects with Liv.52.

(5) Birth to 3 years is the period which has the maximum incidence of hepatic dysfunction for which a preliminary liver injury is presumed and which may progress to cirrhosis of the liver or hepatic failure, if left untreated. Liv.52 may be given a trial as a prophylactic to prevent or arrest the progress of the disease process involved in 'Indian childhood cirrhosis'. This is substantiated by inference from our study, since Liv.52 produces a positive nitrogen balance. Experimental studies which have confirmed this (Joglekar and Kulkarni) have also shown that Liv.52 prevented or reversed liver damage caused in mice by various toxic agents (Joglekar and Leevy).

(6) Liv.52 has a definite place in the therapy to promote a better nutritional balance in the paediatric age group of birth to 5 years. This group is generally affected by various degrees of malnutrition – protein or otherwise – which is most vulnerable to liver injury leading to 'Indian childhood cirrhosis.' The drug stimulates the metabolic activities of the liver as has been demonstrated by improvement in liver function and biochemical findings which in turn contribute to improved appetite.

The judicious use of Liv.52 may help in the regeneration of the liver and help the revitalisation of the human metabolic mechanism through the various unknown channels through which the liver functions.

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