Agri. Res. *J. Kerala, 1970, 8 (1) : 39—43*

SOME STUDIES ON THE EFFECT OF A MULTIPURPOSE FOOD ON THE NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN

L. PREMA and A. G. G. MENON

Agricultural College and Research Institute, Vellayani.

It is now well established that protein malnutrition is widely prevalent among children belonging to low income groups of the population in tropical and sub tropical countries (Prasanna and Indira 1965). The incidence of protein malnutrition is particularly high among weaned infants and pre-school children subsisting on maize and tapioca (Patwardhan 1963). In India as in other developing countries, the per capita production of milk and other animal protein food has not yet begun to meet the requirements of the population (Gopalan *et al* 1969). Considerable attention has been paid recently to find out the possibility of using processed protein foods based on oil seed meals and legumes to supplement children's diet (De 1965). But full information on the use of processed protein foods for enriching the diet of children under the varying dietary conditions of the country is not available. Hence a feeding trial to study the effect of supplementing the diet of children of Kerala on their growth and health was conducted, the results of which are embodied in this paper.

Material and Methods

The present studies were made among the pre-school children (creche) of a nursery (creche) under the N.E.S. Block, Athiyannoor, Trivandrum District, during a period of 6 months from 1st October 1968 to 31st March 1969. A total of 25 children were selected for the studies. Out of these 12 children were fed with the test food in addition to the basic diet while the rest were fed with the basic diet alone. The children were examined every month by a physician following the assessment schedule of the Indian Council of Medical Research (1948). All the children were treated for round worm and hook worm infections.

The basal diet of the children consisted of a noon meal and an evening meal. The food comprised mainly of tapioca and parboiled rice with small amounts of wheat, pulses like green gram and bengal gram, greens, vegetables, fish, groundnut and coconut oil. The test food (Multipurpose food) used in the studies was a blend of groundnut meal and bengal gram flour with added vitamins and minerals. An ounce of the test food had calories 100, protein 12'0 g, calcium 190'0 mg, phosphorus 234·0 mg, iron 1·5 mg, vitamin A 857·0 IU, Vitamin B_1 0'4 mg, Vitamin B_2 1·0 mg, Nicotinic acid 4·0 mg and Vitamin D

studies. Their thanks are also due to Dr. Ramachandran and staff of ICMR Cell, Medical College, Trivandrum, who provided valuable help in the laboratory analysis and to Prof. E. J. Thomas, Professor of Statistics, Agricultural College, Vellayani, for the help given in the statistical analysis of the data.

References

De, S. S. 1965. The present state of protein rich food development in Asia and the Far East. J. *Nutr. Diet 2:* 166

Devadas, R. P. and Thomas, S. 1965. The effect of food supplements on the growth and nutritional status of preschool children. *J. Nutr. Diet 2:* 144

Doraiswamy, T. R., Gutticar, M. N., Panemangalore, M., Rajalekshmi, R. and Swaminathan, M. 1965. Effect of supplementary protein food based on blend of groundnut, begal gram and sesame flours on the growth and nutritional status of school children subsisting on inadequate diets. J *Nutr. Diet 2:* 71

Dumm. M. E., Rao, B. R. H., Jesudian, G. and Benjamin, V. 1966. Supplemented groundnut protein isolate in pre-school children. *J. Nutr. Diet 3:* 25

Gopalan, C., Balasubramonian, S. C., Rama Sastri, B. V. and Visweswara Rao. 1969. *Diet Altas of India.* National Institute of Nutrition, I.C.M.R.: 30

Indian Council of Medical Research. 1948. Nutrition Advisory Committee Report of the Scientific Advisory Board, New Delhi

Patwardhan, V. N. 1963. Nutrition in India. *Ind. J. Med Sci. Bombay*
Prasanna, H. A. and Indira, K. 1965. Use of Indian multipurpose food in the prevention of protein malnutrition in children. *J. Nutr. Diet 2:* 119

(*Accepted : 24-10 1970*)

The concentration of total serum protein and Vitamin A in the blood of children receiving the different diets are given in Table 3.

Table 3

Changes in serum protein and Vitamin A contents of blood samples of children receiving different diets

	Basal diet + test food			Basal diet alone		
	Initial	Final	Mean increase	Initial	Final	Mean increase
Serum protein (g percent)	6·73	7·82	1·09±0·19	7·37	7·03	0·34±0·13
Vitamin A content in Serum (meg percent)	17·60	18·00	0·40±1·62	21·40	16·80	4·60±1·73

It is seen that for the group receiving the test diet there was a constant increase in the percentage of blood serum protein whereas in children receiving the control diet alone the percentage of protein steadily decreased during the experimental period. Prasanna and Indira (1965) had reported similar results earlier. In the case of Vitamin A the test diet did not have any significant effect as reported earlier by Dumm *et al* (1966).

Summary

A feeding trial participating children of 2 to 5 years of age (attending a creche at Chappathu in the N.E.S. Block Athiyannoor, Kerala) conducted for six months, in which the efficiency of a multipurpose food was tested, showed that height and weight and haemoglobin, packed cell volume and serum protein contents of blood increased significantly in children receiving the multipurpose food. Chest depth, hip width, arm girth and Vitamin A contents of blood were not significantly affected by the test diet.

Acknowledgements

The authors are grateful to the staff of Chappathu creche, to the Block Development Officer, N.E.S. Block, Athiyannoor and to the Assistant Medical Officer, Neyyattinkara, for rendering necessary facilities for conducting the

It may be seen that there is significant increase in height, weight, chest depth and hip width in chidren receiving the test food over those not receiving the test food. However, there is no significant increase in chest depth and arm girth measurements due to the special food. Dumm *et al* (1966) in their studies with supplemented ground nut protein isolate in pre-school children have reported similar results.

Clinical features. Three children in the group receiving the test food were suffering from anaemia, coated tongue and general apathy at the beginning of the experiment. Their condition improved at the end of the feeding trial according to the physician's report.

Four children out of thirteen in the control group had the similar clinical features and no improvement was noticed in their condition during the six months of the experiment. Devadas and Thomas (1965) have also shown that the children receiving protein rich food supplements recover from anaemia, coated tongue and other similar conditions.

Biochemical features. The data on haemoglobin, red blood corpuscles and packed cell volume are summarised in Table 2.

Table 2

Changes in haemoglobin content, R.B.C. count and packed cell volume of blood samples of children receiving different diets

Factors	Basal diet+Test food			Basal diet alone		
	Initial	Final	Mean increase	Initial	Final	Mean increase
Haemoglobin (g percent)	8·94	12·63	3·69±0·53	8·76	9·78	1·02±1·25
Packed cell Volume %	29·5	33·5	4·1±0·79	31·0	31·6	0·6±0·59
RBC 100/cmm	2·52	3·98	1·46±0·24	3·12	3·40	0·28±0·17

The average haemoglobin concentration in the blood of children receiving both test diets and basal diets increased but this increase was significant only in the case of children consuming the test diet. Significant increases in the packed cell volume and RBG were also noted in children under the test diet. Doraiswamy *et al* (1965) reported similar results earliear.

71·0 IU. The test food was incorporated with the evening meal served at 3 p. m., before sending the children back to their home from the creche. Each child received 28'4 g of test food per day. The nutritive values of the basal diet and the mixture of basal diet and test food are given below :

Nutritive values of basal diet and test food basal diet mixture

Nutrients	Basal diet test food mixture	Basal diet alone
Calories	1000·0	900·0
Protein (g)	32·0	20·0
Calcium (mg)	353·0	163·0
Phosphorus(mg)	398·0	164·0
Iron (mg)	18·8	17·3
Vitamin A (IU)	4222·0	3365·0

Note: Food taken at home provided for an additional 1·5 gm of protein and 75 calories per day as has been revealed in surveys.

Results were assessed in terms of increase in anthropometric and clinical and biochemical assessments.

Results and Discussion

Increase in the anthropometric measurements of children receiving and not receiving the test food are given in Table 1.

Table I

Average increase in anthropometric measurements of children receiving different diets

Diet	Height (cm)	Weight (Kg)	Chestdepth (cm)	Hip width (cm)	Arm girth (cm)
Basal diet + test food (test diet)	3·23 ± 0·41	1·63 ± 0·11	0·7 ± 0·89	1·13 ± 0·1	0·43 ± 0·15
Basal diet alone	2·22 ± 0·19	1·02 ± 0·18	0·62 ± 0·79	0·79 ± 0·13	0·38 ± 0·15