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Protein - Calorie Malnutrition – The Need for a Proper Perspective

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Protein calorie malnutrition is one of the biggest nutritional problems facing the developing countries of the world. The diseases known as kwashiorkor and marasmus represent the extreme forms of protein calorie malnutrition. Protein calorie malnutrition is not a disease of acute or explosive onset. In a child subject to the stress of undernutrition, there is a continuous and insidious transition from the stage of normality to the stage of kwashiorkor or marasmus. In poor communities we can see cases in all stages of this transition.

Our assessment of the magnitude of the problem of protein calorie malnutrition will vary depending upon the diagnostic criteria we adopt. Thus, in India, on the basis of the incidence of growth failure, we may assess the prevalence as 80% among pre-school children of poor communities, while on the basis of occurrence of kwashiorkor, the prevalence at any point of time, will be as low as 1.2%. Kwashiorkor and marasmus represent the extreme and result in a chain of events extending over several months. It will be poor strategy both from the public health and economic points of view to concentrate a major part of our meagre resources on the treatment and rehabilitation of this group. And yet, when we survey the vast plethora of literature on the subject of protein calorie malnutrition, we will be struck by the fact that till recently, we were mostly preoccupied with the study of the kwashiorkor state. Our approach to the problem of protein calorie malnutrition has been largely clinical rather than epidemiological. Some of the current distortions in our approach to the problem of protein calorie malnutrition have stemmed from this. Fortunately, in recent years there have been a number of epidemiological studies which have helped us to see the problem in proper perspective.

The impression has been propagated that the major factor underlying widespread protein calorie malnutrition in early childhood is primarily protein deficiency. This concept had unfortunately greatly influenced the general thinking and planning with regard to this problem, with the result that there has been overwhelming emphasis on " protein foods ", " protein concentrates "

and the so-called " protein gap ". Probably, a major reason for this was that precise data on the actual dietaries of pre-school children in poor communities were scanty. Fortunately, to-day, thanks to the extensive studies undertaken by the Indian Council of Medical Research in several centres in India using standardised methods, the problem is being seen in proper perspective.

The Indian Council of Medical Research organised a country-wide survey of the dietaries of poor pre-school children. This survey was carried out in six different centres of the country–Hyderabad, Vellore, Poona, Bombay, Delhi and Calcutta, by carefully trained personnel using standardised methodology. As a result of this exercise, to-day we have reliable information regarding the dietaries of poor pre-school children in India. The survey showed that the daily protein intake of these children ranged from 2.8 g/kg body weight to 1.7 g/kg-levels which on the basis of national and international recommendations, could be considered adequate. On the other hand, the daily calorie intake was very low being of the order of 70 to 75 Kcals/kg as against the figure of 100 Kcals/kg which is generally considered adequate for children of this age group The protein quality of the diet was found to be satisfactory.

It may be argued that the above figures of average intake may be misleading in view of the variations in the intakes of individuals. In order to overcome this objection, the relative deficiencies of proteins and calories in the dietaries of pre-school children were studied through the device of cumulative frequency distribution of children according to the intake. According to this analysis, on the basis of accepted desirable levels of intake, 92% of the children were found to be deficient in calories ; of these 35% were deficient in proteins as well. Even with regard to these latter 35% of children, if the food intake had been raised to meet their caloric requirements, the protein needs would have been automatically met and there would have been no protein deficiency. There was no situation where the child was adequate with regard to calories but deficient with regard to proteins alone.

The position that emerged clearly from this analysis was that in the current dietaries of our poor pre-school children, the major bottleneck is calories and not proteins. It seems from this analysis that if the children were to get greater quantities of their traditional cereal-pulse based diets in amounts that would meet their calorie requirement, their protein needs would be met. It is essential to emphasise this point, because in the last few years, there has been considerable emphasis on the so-called " protein gap " and several protein concentrates have been recommended to combat the situation. The provision of protein concentrates in the face of calorie deficiency is a wasteful approach. Where there is calorie deficiency, a high proportion of protein tends to be utilised for energy purposes.

Similar surveys of dietaries of pre-school children in Guatemala, the Carribean, Thailand and other countries have also clearly brought out that the real bottleneck is calories and not proteins. Unlike African dietaries, which are predominatly based on starchy foods like tapioca and plantain, and which are extremely poor sources of protein, Asian dietaries are based on cereals and pulses which are fair sources of protein. If poor Asian children can be fed the usual cereal-pulse based diets in amounts sufficient to bridge their calorie gap, the problem of protein calorie malnutrition will largely disappear. What we are, therefore, really dealing with is a " food gap " rather than a " protein gap ". In practical terms these observations imply the need for a radical reorientation in our thinking and approach to this problem and the removal of the undue emphasis on protein.

It must, however, be emphasized that the existing diets of our pre-school children in Asia are deficient in several minerals and vitamins, such as riboflavin, vitamin C, iron and calcium and extremely low in vitamin A. Even by increasing the level of consumption of current diets to levels necessary to satisfy caloric needs, there would still exist deficiency of vitamin A, iron, riboflavin, vitamin C and calcium. Therefore, the real need with regard to the dietaries of our pre-school children is to bridge the calorie gap and bring about qualitative improvement with regard to several minerals and vitamins. The latter can be achieved to a considerable extent through the inclusion of green leafy vegetables in the dietaries. At present, the dietaries of our pre-school children do not include significant amounts of green leafy vegetables.

In malnourished communities, there is a high incidence of infections and worm infestations. While malnutrition increases the susceptibility to infections, infection tends to aggravate malnutrition, and our poor communities are caught in this vicious cycle. It has been suggested that the protein intake of children in poor communities should be raised to provide blanket coverage for possible increased requirements caused by infections. A careful examination will show that this suggestion is impracticable, uneconomical and unscientific. Infections cause increased requirements of not only proteins but of calories and a number of other nutrients. The logical answer is to control infections and infestations through improvement of environmental sanitation of the community. Obviously, where the pot is leaky, the answer is to plug the leak and not pour more water into the pot to provide for the leakage. Where food is scarce, our strategy must be to control factoirs which prevent the utilization of food.

Moreover, it is difficult to quantify the effect of infection on protein requirement and to decide on the quantum of blanket coverage. The body tends to lose protein at the height of infection irrespective of the level of protein in the diet. On the other hand, there is an attempt to conserve protein in the

post-infection phase. At any given time, in any poor community, there may be some children in the stage of active infection, some in the post-infective phase and some in the incubation stage. Under the circumstances, provision of increased protein as a blanket coverage will be wasteful in a large proportion of children. In any case, the provision of more proteins alone will not eliminate the several other effects of infection. Even after providing more proteins in order to ensure the health of the community, infections have in any case got to be eradicated. Thus, the argument for increased protein levels on the ground that our poor communities suffer from infections will not bear scientific scrutiny.

On the basis of carefully gathered data, it is now evident that the average calorie deficit in the dietaries of poor pre-school children in many Asian countries is of the order of 300 calories per day. For supplementary feeding programmes for pre-school children, therefore, the minimum quantity of supplement needed to meet this calorie gap would be about 75 g. At this level of intake, a protein content of 12% in the supplement would be more than sufficient to meet the protein requirement. On the other hand, the present protein concentration of preparations now widely used for feeding programmes, is about 22%. Such a high level of protein concentration is totally unnecessary. We can achieve a wider coverage at less cost using supplements with lower concentrations which will correct the calorie deficit. The conclusion that supplements providing as low as 10 to 12% of protein will be quite effective and that supplements providing as high as 20% protein are unnecessary is of tremendous practical importance. A 12% concentration of protein can easily be achieved using locally available foods, and such supplements do not call for elaborate processing ; on the other hand, recipes containing as high as 22% of protein will necessarily involve considerable processing and cannot be obtained under rural conditions.

Several nutritious recipes based on inexpensive locally available foods involving minimal processing have been developed by the National Institute of Nutrition, Central Food Technological Research Institute and other centres in India and other countries. Details of these recipes developed at these centres have been published by the National Institute of Nutrition, Hyderabad. The development and propagation of such a wide range of recipes based upon locally available foods suitable for different regions and different countries should form the basis of a massive decentralised programme of nutrition uplift of our poor rural communities. There is no major problem of malnutrition in any Asian country which cannot be solved by locally available foods. The processes used must be such as are capable of application at the home or village level. This approach may lack the glamour associated with expensive, elaborate and sophisticated processing, but in the long run may prove more rewarding and yield more tangible results in our country-side.

A challenge to our food technologists is to device procedures which will help reduce the bulk of cereal-based diets. An ounce of rice, after cooking, swells to about three ounces. In view of their bulk, cereal-based diets have to be fed to very young children several times in the day so as to ensure adequate intake. The inclusion of fats or oils in the diets will reduce the bulk and increase calorie density, but fats and oils are expensive, and our poor communities can hardly afford them. Most of the recipes based on cereals become bulky when they are cooked and ready to serve. Many feeding programmes have failed for the simple reason that young children are unable to consume this amount at one sitting.

Under these circumstances, methods have to be divised by which the bulk of the cereal-based diets can be reduced. Simple traditional methods for reducing bulk of cereals have been in vogue in Asian countries for centuries. Technologists must rediscover and improve upon these methods. " Beaten-rice ", " exploded " and " puffed " cereals and pulses are well-known in India. Beaten rice is pre-cooked and on reconstitution do not swell to the same extent as untreated grains.

In the ultimate analysis, the nutritional uplift of our poor communities can be achieved not through any state-sponsored supplementary feeding programmes or through sophisticated processed foods, but through the improvement of economic and living standards of our people and through educating village communities to effectively utilize locally available foods for better nutrition.