PROTEIN IN ORIYA DIET*

SNEH LATA REWAL

New Delhi

A large number of dietary and nutritional surveys carried out in the past in different parts of India have shown that there is widespread malnutrition and particularly protein malnutrition among vulnerable groups. Nearly 4 out of 5 children between the ages one and five suffer from at least a moderate degree of growth retardation; one to two per cent of these children suffer from severe types of malnutrition like kwashiorkor and marasmus (National Committee on Science and Technology, 1973). To combat this malnutrition, the last decade witnessed a large number of feeding programmes in operation. Several agencies, both national and international poured millions of rupees worth of high quality protein supplements into the rural areas and the urban slums. These school feeding and milk feeding programmes cover between 10 to 15 million children and young mothers (Gopalan and Subramanian 1968). The underlying belief is that the cause of the protein malnutrition is insufficiency of good quality protein in the diet.

In 1969, in Orissa, dietary data were collected as a sub-study of the survey School Lunch in Orissa. The design of the study required a random sample of the beneficiaries of the CARE feeding programme and matched sample of the non-beneficiaries. These data as such cannot be generalised for the entire Orissa State as it is limited to only school going boys and their families. But these data are indicative as the study covered 1200 school boys and their families in all the 13 districts of Orissa. A comparison of the nutrient content of the diet of the beneficiaries of the CARE feeding programme and non-beneficiaries have been presented in the report School Lunch in Orissa and a detailed study of only the home diets of the sampled boys and their families have been reported in Oriya Diet—A Survey of School Boys’ Families. The objective of this paper is to examine the total quantity and the quality of the proteins in the diets of these families. As the dietary composition of the family (per capita) and the boys is similar, only the per capita dietary data is further analysed to determine the protein value of the diet.

Methods and Materials

The data were collected by the self record keeping method (Roy and Rath 1972). This method required the respondents to record on three questionnaires the dietary intake of their families and themselves for four consecutive days. The quantity of the food was recorded after measuring in standardised katoras. Similarly, the food was measured with a set of six
standardised katoras, before and after cooking. This method was validated against existing methods (24 hour recall and observation and measuring by investigators) and was found to be both reliable and inexpensive in terms of time and personnel. The calorie, protein and amino-acid content of the diet was computed by using the value provided by the ICMR (Gopalan et al. 1971). Protein value of the diets expressed as net dietary protein—Cal % (NDp Cal%) was calculated employing the equation suggested by Miller and Payne (1961). The chemical score of the protein was computed on the basis of the sulphur containing amino acids being the limiting ones (Cameron and Hofvander 1971).

Findings

The total daily amount of protein in the Oriya diet was 57 G. The ICMR has placed the recommended allowances at 46 G. (National Committee on Science and Technology 1973). In fact, the dietary intake of 71 per cent of the family members met the recommended allowances; the intakes of only one-fourth of the family members were below the recommended level. When the dietary proteins were computed in terms of PER 2.5 equivalent i.e., FAO reference proteins, 78 per cent of the total proteins were found to be effective. The “reference” protein in the diet was 44 G., being very close to the recommended allowances. Briefly, the dietary protein was both quantitatively and qualitatively adequate.

These observations regarding quantity and quality were also supported by the NDp Cal % values of the diet, an index which takes into consideration both the quantity and quality of the protein in the diet. The NDp Cal % of the diet was 6.6 (Table 1). Thus, the diet was able to provide more than 5 per cent of the calories as utilizable protein and was capable of meeting the physiological needs of both adults and children.

In order to assess more precisely the protein quality of the diets, the aminoacid composition of the diet was computed (Table 2). The results of the analyses showed that when compared to the aminoacid pattern of the egg protein, sulphur aminoacids (methionine

<table>
<thead>
<tr>
<th>Calories</th>
<th>Total protein (G.)</th>
<th>Reference protein (G.)</th>
<th>Animal protein (G.)</th>
<th>Score</th>
<th>P Cal %</th>
<th>NDp Cal %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030</td>
<td>57</td>
<td>44</td>
<td>5</td>
<td>67</td>
<td>11.2</td>
<td>6.6</td>
</tr>
</tbody>
</table>
### Table 2. *Amino acid pattern (G. per G. Nitrogen)*

<table>
<thead>
<tr>
<th>Name of amino acid</th>
<th>Egg value</th>
<th>Actual</th>
<th>% Egg value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leucine</td>
<td>0.553</td>
<td>0.561</td>
<td>101</td>
</tr>
<tr>
<td>Isoleucine</td>
<td>0.415</td>
<td>0.308</td>
<td>74</td>
</tr>
<tr>
<td>Lysine</td>
<td>0.403</td>
<td>0.299</td>
<td>74</td>
</tr>
<tr>
<td>Phenylalanine</td>
<td>0.365</td>
<td>0.339</td>
<td>93</td>
</tr>
<tr>
<td>Cystine</td>
<td>0.149</td>
<td>0.083</td>
<td>56</td>
</tr>
<tr>
<td>Methionine</td>
<td>0.197</td>
<td>0.095</td>
<td>48</td>
</tr>
<tr>
<td>Threonine</td>
<td>0.317</td>
<td>0.218</td>
<td>69</td>
</tr>
<tr>
<td>Tryptophan</td>
<td>0.100</td>
<td>0.059</td>
<td>59</td>
</tr>
<tr>
<td>Valine</td>
<td>0.454</td>
<td>0.329</td>
<td>72</td>
</tr>
</tbody>
</table>

and cystine), tryptophan, and threonine are the first, second and third limiting aminoacids respectively (Table 2). Contrary to the general belief, lysine deficiency is not the constraint in the diet.

**Discussion**

It is evident from the above findings that the total amount of protein in the Oriya diet is not deficient. Even the “reference” protein is close to the recommended allowances. Another important factor to note is that the diet contained sufficient concentration of proteins to provide satisfactory levels of NDp Cal %. In short, the existing diet is capable of meeting the protein requirement of different segments of the population. At this point, it would be interesting to investigate the sources of the protein in the diet. The intake of animal protein was 5 G. (9 per cent of the total protein), in spite of the fact that 99 per cent of the population is non-vegetarian. Eighty four per cent of the total protein was derived from cereals and pulses. This finding is further substantiated by calorie-protein relationship in the diet. An increase or decrease in their consumption causes parallel movement in both calories and protein. Thus, the popular belief that the protein of the cereal based diet or of vegetable origin is of poor quality is rejected by these findings. The protein of the pulses and the small amounts from
animal sources make good the insufficiency by supplementing the deficiency of the cereal proteins.

An extremely crucial question about the cause of the protein malnutrition still needs to be answered. If the protein in the diet is quantitatively and qualitatively adequate, then what causes protein malnutrition? To answer this question one may look into the calorie intake in the diet because of the known facts of protein metabolism. A protein can fulfil its nutritive functions satisfactorily only when the needs of the body for calories are fully covered. The findings of our study indicate a deficiency of calories in the diet. One half of the families did not meet the calorie requirement in the diet. Consequently, this adequate protein in the diet is diverted to provide calories and then utilised for tissue growth, leading to conditioned deficiency in protein. To summarize, the actual cause of protein malnutrition was detected by taking into account the inter-relationship of the calorie and protein intake in the diet and by simultaneously examining these two variates.

The next crucial question is how to combat this protein malnutrition? Of course, the answer is not high quality protein concentrates. The accent in the past in most of the supplementary feeding programmes have been on protein supplements. For conquering this protein gap, cereals have been fortified by aminoacids. These have been rather expensive ways of bridging this gap in the diet. In fact, what the diet needs is calories. The existing diets are able to provide sufficient protein. These existing diets if consumed in sufficient quantity would provide both the calories and the protein required by the body. It is a wasteful approach to provide protein concentrates in the presence of calorie deficiency (Narsing Rao et al. 1969).

Summary

This paper examines the protein value of the diet of the families of the school going boys in Orissa. The dietary data were collected by the self record keeping method as a sub study of the survey School Lunch Programme in Orissa. The calorie, protein and amino-acid content of the diet were computed by using the food value tables provided by the ICMR. Further, the quality of the protein in the diet was evaluated by calculating NDp Cal. %. The total amount of the protein in the diet exceeded the recommended daily allowances by the ICMR. Only one-fourth of the family members were found to be consuming diets deficient in proteins. Qualitatively, the total amount of reference protein in the diet almost met the recommended allowances. The lysine aminoacid is not a constraint in the diet. The first, second and third limiting aminoacids were sulphur aminoacids (methionine and cystine), tryptophan and threonine respectively. The NDp Cal % was 6.6. Thus, the protein in the diet was capable of meeting the needs of both children and adults. Protein malnutrition was caused by the conditioned deficiency of proteins in the diet. The diets were deficient in calories (53 per cent of the family members were consuming less than the recommended allowances of calories). Protein in the diet is first utilised to
provide calories and then is used for body building purposes. As the existing diets were qualitatively adequate, the deficiency can be made good by consuming these diets in sufficient quantity.

References


