

Prevention of Malnutrition in Iran: 1. Vitamins.

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The diet of Iran has undoubtedly improved lately, but still the problem remains one of too greater dependence on a single staple food, bread. As a general statement, 70-90% of dietary energy in most diets of the lower socioeconomic sectors in Iran comes from bread (7). A survey of 6 villages near Tehran found an average daily bread consumption of 545 g in one village to 780 g in another, while rice made up only 80 to 140 gm(4). A survey of the Caspian Littoral however found some areas to be bread-eating and others rice-eating, with some areas where bread and rice coexisted equally(5). These surveys also showed that consumption of other foods,

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especially of animal origin is low. For example, near Tehran the animal protein intake varied from 7 to 11 gm. Another survey in a village near Shiraz found 33% of families obtaining less than 3 gm animal protein per day (2). Up to 200-400 gm fruit may be eaten in summer (4), but intakes are extremely variable, depending on the area and season (5).

Because of the over-emphasis on bread in the diet, those vitamins that are lacking in bread determine the overall existence of vitamin deficiencies in the diet. For example, the low riboflavin content of Iranian bread (7) leads to the low daily intakes of 0.6 to 0.9 mg per person found in the survey near Tehran. It was calculated that only 3% of households were meeting the allowance in these villages, and this observation is supported in the Caspian Littoral where only 2 out of 38 minisurveys found enough riboflavin to meet the allowance. Luckily the FAO/WHO committee have set the allowance much higher than the intakes associated with clinical deficiency signs such as cheilosis (11). Nevertheless, in Iran these signs have been frequently observed (4,12).

Bread is almost devoid of vitamin A activity and therefore it is not surprising that dry skin and follicular hyperkeratosis are seen in Iran. In villages near Tehran, 25% of schoolchildren showed these signs (4). A

similar proportion of poorly growing village children near Shiraz had a history of night-blindness as well as showing these two cutaneous signs (12). The requirement of vitamin A has been set at 750 ug but a nationwide survey found that 28% of households were obtaining less than 100 ug per person daily, and generally 70% comes from fruit and vegetables rather than animal sources(16).

Seasonal variation in availability and price of fruits and vegetables determines vitamin C intake. Even in summer, only 64% of village households near Tehran obtained more than 45 mg daily (4). The allowances set by every country are at least 3 or 4 times as much as the minimum of 10 mg required to prevent scurvy (11), but 3 out of 38 minisurveys in the Caspian Littoral found intakes below this value (5). Despite the fact that it was summertime when the survey was performed, 18% of schoolchildren near Tehran had bleeding gums, which is often taken as a sign of vitamin C deficiency (4).

The intake of vitamin D from foods is very low, especially because of the low consumption of animal products. However, because this vitamin can be made by the action of sunshine on the skin, it would be expected that Iranians would not suffer from deficiency. Never-

theless, some infants have rickets due to lack of exposure to sunlight and the effects on calcium metabolism of the phytate and fibre in Iranian bread which is introduced early to infant diets(1,12,17) Because of the recent discovery of watersoluble vitamin D in breast milk (8), deficiency of vitamin D in the mother may also be an important cause of rickets.

Deficiencies of other vitamins would be expected to be extremely rare because of their presence in bread. The thiamin content of Iranian bread is good (7,12), and consequently in the village survey near Tehran, the requirements were being met by 99% of households, and this was also true in the Caspian Littoral surveys. Niacin levels in bread are also adequate (7,13), with 96% of village households meeting the allowance near Tehran. Similarly the pyridoxine content of bread is adequate (13), and recent analyses show that the folic acid content of Iranian bread is also good (15), and so are serum folate levels (14). The vitamin E content of Iranian bread is also adequate (13), as was the plasma tocopherol in one study (16), Vitamin B<sub>12</sub> is made by bacteria that contaminate most foods and deficiency is only found in persons who are both extremely hygienic and also eat only vegetable foods. Vitamin K is made by bacter-

ia in the intestine and therefore a dietary source is generally unnecessary, and the remaining two vitamins, pantothenic acid and biotin are so widely distributed in foods that there is very little evidence that deficiency states occur in more than a few isolated special circumstances (3).

It can be concluded that the three major vitamin problems of Iran are riboflavin, vitamin A and vitamin C. In order to improve the diet, Table 1 shows which foods are especially rich in these vitamins. Liver is an excellent food and should be eaten when available. Milk and dairy products are well established Iranian foods but require further emphasis and improved availability. It should be noted that a bottle of milk exposed to sunlight will lose about 50% of its riboflavin in half an hour (9), and therefore milk be sold in cartons or coloured bottles that prevent riboflavin destruction. Although not very rich sources of these vitamins, meat and pulses are good additions to the diet and are also especially useful protein and mineral sources. Green vegetables and fruit are absolutely essential and should not be considered as only seasonal pleasures. Deficiencies of vitamins A and C are unfortunately common even in lushly green tropical countries because of sheer ig-

Table 1 The usefulness of different food groups as vitamin sources (3).

<u>Food</u>	<u>Riboflavin</u>	<u>Vitamin A</u>	<u>Vitamin C</u>
	<u>mg/Kg</u>	<u>mg retinol eq.Kg</u>	<u>mg/Kg</u>
pulses	1-3	0.1-0.6	0-300
meat	1-3	0-0.2	trace
liver	20-30	12-135	trace
eggs	3-5	3	trace
cheese	3-5	4-5	0
butter	0	7-12	0
milk	1.5	0.2-0.7	0-10
green vegetables	0.5-3	0.1-12	100-2000
fruit	0.1-1	0.2-3	0-3000

norance (3). Only the north of Iran could be described as very green, but even in other areas still greater importance should be given to growing fruits and vegetables where water supplies allow. Although most of Iran is a desert, it is important to point out that, because of the system of underground canals, or qanats, water is probably plentiful enough in most places to allow increased fruit and vegetable cultivation (20). In re-

Table 2 Analysis of the usefulness of multivitamin preparations as dietary supplements in Iran.

<u>Product</u>	<u>Riboflavin</u>	<u>Vit.A</u>	<u>Vit.C</u>	<u>Price</u>	<u>Dosage</u>	<u>Vit.D</u>
"Unicap Multivitamin"	*	***	**	***	***	**
"Viplex"	**	*	***	***	***	*
"Supradyn"	*	***	**	***	*	*
"Multibionta"	*	**	***	**	***	***
"Unicap Therapeutic"	**	*	***	**	**	*
"Geriplex"	***	**	*	**	**	—
"Omnibionta"	**	*	***	*	***	**
"Geriatric"	*	**	***	*	***	**
Pharmaton"						
"Vitaten"	**	*	***	*	***	**
"Hormo-Gerobion"	**	***	*	*	***	*
"Dianavit"	*	**	***	*	***	—

The more asterisks, the more emphasis is given to that vitamin, the cheaper the product and the more suitable the dosage rate is for dietary supplementation. The following products did not contain all of the vitamins, i.e. riboflavin, vitamin A and vitamin C: "Becozymin (3 types); Benutrex C; Benutrex Oral; Neohepacon Oral Compound; Neurobion; Opotonique Vitamine; Panbetine; Pernexin Elixir; Bolybion (3 types)".

gard to vitamin C, it is unfortunate that many of the most common dishes in Iran require considerable periods of cooking. Because of the sensitivity of vitamin C to oxidative destruction in cooking, increased use of salads, uncooked fruits, and lightly cooked vegetables would be recommended (3).

A second approach to solving the vitamin problems in Iran is very much less to be preferred, but could be useful until the required dietary changes have been accomplished. The administration of vitamins can be achieved in several ways. Firstly, the vitamin can be added to the food (10). In the production of certain, foods like white flour, vitamins are lost, and in some countries these are restored to their former values. Other foods are enriched in the vitamins that they normally contain in small amounts, for example vitamin D-milk in the U.S.A. Foods may also be used as carriers of vitamins which are not normally present. The main object of this approach is to take a widely used and relatively inexpensive commodity and to incorporate in this sufficient vitamins to cover the needs of the majority of the population. Margarine is a typical example. This is produced mostly from vegetable oils and contains practically no vitamins A or D, but has been used as a carrier



for both these vitamins in many countries. Because manufacture of vegetable oil in Iran is centrally controlled in a few factories, legislation could be enacted to require vitaminization of this product. Recently, an attempt has been made to promote the vitaminization of bread (19), but unfortunately this product is made in too many scattered localities to make this project generally applicable. For the water-soluble vitamins, riboflavin and vitamin C, no ready carrier is available. One centrally produced food is sugar, but, because of its colour, riboflavin enrichment would probably cause consumer rejection. Also if it was announced that sugar was enriched with vitamins, consumption might increase, and nutritionists would never recommend this for many reasons. For example sugar lowers the appetite for other foods which provide important nutrients and it also causes dental caries (3).

Individuals may be prescribed preparations of vitamins in two ways. The "Stoss" technique involves the administration of very large amounts of vitamin that will last for many months (6). This is only available for fat-soluble vitamins like vitamin A and vitamin D. Stoss therapy is useful because the patient need only be seen infrequently, but it fails to correct the deficiencies

of riboflavin and vitamin C.

Another approach is to prescribe multivitamin preparations. In order to find a useful product, an unbiased sample of those available was taken as the total stock of a large city pharmacy in Isfahan (July 1977)<sup>1</sup>. From the advertised contents, it was found that only 11 out of 24 contained all three of the vitamins, riboflavin, vitamin A and vitamin C. According to the FAO/WHO allowances for an adult man (11), the number of asterisks in Table 2 shows which of the three vitamins was most stressed by each product. The price for a days requirement of the most

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Footnote 1

A critical assessment of the general nutritional balance of these products has been accepted for publication by the Lancet. Limiting of these vitamins was calculated. They were divided into three groups:  $0 - \frac{1}{7}$ ,  $\frac{1}{7} - \frac{2}{7}$  and  $\frac{2}{7} - \frac{7}{7}$  in proportion of the most expensive, "Geriatric Pharmaton". The cheapest products are shown as those with the most asterisks. For dietary supplementation, the dosage required should be near to 1 unit of preparation per day, and such products have been given 3 asterisks. Rather more concentrated products have 2 asterisks,

while "Supradyn", which is very concentrated has only 1 asterisk, These products would be prescribed for short periods to very malnourished patients, but are not useful for simple dietary supplementation. Amongst the products, "Unicap Multivitamin" is both in the cheaper group, with a good dosage rate, and also contains vitamin D for housebound patients. Similarly "Viplex" at a dose of 1 teaspoonful daily is also well-priced and could easily be given to infants and small children, but unfortunately its vitamin D content is not very high for infants and pregnant women. At the time of survey, the price for a days supply of these two products would be between 30 and 50 ms per month for an adult. Because the diet does contain some of the vitamins, the dosage could also be halved and still be effective.

Unfortunately these products will not supply energy, protein, or minerals. It is hoped to investigate various ways to improve other aspects of Iranian nutrition in future articles. The authors would like to express their regret at the non-inclusion of any product that was not found in the pharmacy surveyed. They would also like to state that the products that were not recommended for dietary supplementation in Iran may be useful for other purposes that were not investigated by the authors.

### Summary

The over-reliance on bread in the Iranian diet may lead to relative deficiencies of riboflavin, vitamin, A, and vitamin, C, with housebound persons also suffering from vitamin D deficiency. The increased consumption of animal products, fruit and vegetables should be prescribed. Economic progress could help to improve diet, and is probably already doing so. Increased nutrition education at all levels is essential, especially during teacher training, so that the information would reach schoolchildren. Even medical doctors receive a very short period of nutrition training so that it is not surprising that other sections of the population are also poorly informed. In the meantime, vegetable oil could be vitaminized, and research could aim at discovering ways to enrich other foods also. Patients at risk can be given periodic injections of vitamins A and D, or they may take 1 capsule of "Unicap Multivitamin" or 1 teaspoonful of "Viplex" daily or every two days.

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