

DIET IN TUBERCULOSIS

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THE importance of nutrition in the production and course of tuberculosis has long been recognized in medicine. Deficiency of nutrition is

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regarded as one of the predisposing causes of tuberculosis and the disease itself is characterized by considerable wasting of the tissues. Proper feeding, therefore, plays an important rôle both in prophylaxis and treatment of tuberculosis. 'Good food' is one of the fundamental items of our present-day sanatorium regime. But although the need of supplying proper nourishment is generally accepted, there has been much controversy in recent times as to the quantity and nature of foodstuffs required. Hippocrates about 400 B.C. advocated a milk diet when there was no high fever and barley water and honey for febrile states, whereas John Mirfield in A.D. 1400 put forward the claims of 'river crab and sugar of roses'.

• *Overfeeding:—Old and modern views*

In the earlier period of sanatorium treatment Otto Walther of Nordach preached and practised 'stuffing' of his patients with as much food as they could be made to take. He taught his patients to eat whatever was put before them irrespective of their appetite, taste and state of digestion. If the patients vomited, they had to start all over again. One of the enthusiasts (Debove) went so far as to introduce food through the stomach tube. In other words, overfeeding was regarded as a 'cure' and the patients were made to swallow food like medicine.

The idea of 'food cure' which held sway for a considerable time was gradually given up. It was later found that the rapid and excessive gain in weight which followed forced feeding did not help in increasing resistance or combating tuberculous toxæmia; nor did it enhance the process of cicatrization of lesions. On the other hand, the overload of useless fat and water greatly undermines the general health. The patient is weak, flabby and breathless with rapid pulse; his appetite and digestion are impaired and in some cases the digestive mechanism is so upset that the patient loses in a few days what he had gained in several months.

It is now customary to take a more rational view. We now recognize that the progressive increase of weight is not an index of improvement unless it is also accompanied by amelioration of symptoms and unless physical signs and x-ray examinations show evidence of healing. Consistent with these improvements, we aim at a slow and persistent gain finally reaching 10 to 15 lbs. higher than the patient's normal weight in health.

Adequate and balanced dietary

(a) *Caloric value.*—What is required is not overfeeding but an adequate and balanced diet. Bardswell and Chapman (1908) after a thorough experimental study of the subject concluded that 3,000 calories per day are quite sufficient. The figures published by the League of Nations and the British Medical Association corroborate Bardswell and Chapman's standard. The

average Indian patient will require a little less but a patient who will not improve with 3,000 calories will not do so with any amount of stuffing.

(b) *Proteins*.—Besides the requisite caloric value, the food must contain all the proximate principles—protein, fat, carbohydrate and vitamins in proper proportions. As tuberculosis is associated with considerable wasting of protein elements, the natural tendency was to make good this loss by feeding on excess of protein food. Some advocated animal proteins while others preferred vegetable proteins. In France, eating of raw meat (zomotherapy) was in vogue. Proteins, however, are said to increase the respiratory activity, and, as fats and carbohydrates are known to be protein-sparers, this has been used as an argument against excessive meat eating.

In India where the people are mainly vegetarian, milk is the chief source of protein. Non-vegetarians may make a wide choice from goat, mutton, game and poultry. In Bengal, fish supplies a cheap source of easily assimilable proteins.

(c) *Fats*.—The one advantage of fat is that, unlike protein and carbohydrate, it does not materially increase the volume of respiration or metabolism. But an excess of fat inhibits gastric secretion and is not well borne by most patients. Apart from its inherent vitamin content, fat by itself does not possess any specific healing power. Feeding on excess of fat should therefore be discouraged. Of all fats, butter is most liked by patients and is easily digested. Ghee and vegetable oils, which are used for cooking, are good vehicles for supplying fat, besides making the food more appetizing.

(d) *Carbohydrates*.—As for carbohydrates, we take more rather than less of it. Patients on high-carbohydrate and low-fat diet put on more weight than those on high-fat diet. As carbohydrates spare both protein and fats, they play an important part in body building.

(e) *Vitamins*.—Vitamins A and D are credited with having the power of increasing resistance against tuberculous infection. They are derived from the fatty food contained in a balanced dietary, and it is customary to prescribe these in excess in the shape of cod-liver oil, adexolin, haliverol, etc. Recently Abbasy, Harris and Ellman (1937) have shown that patients with active tuberculosis must take much more anti-scorbutic vitamin (vitamin C) than normal individuals before it can be detected in their urine.

Two oranges a day or their equivalent amount of dry ascorbic acid (vitamin C) are worth while adding to the dietaries.

(f) *Minerals*.—Cereals combined with green vegetables and fruits supply all the mineral salts required.

Condiments.—These are best left to individual taste. In institutions, however, where diverse tastes are to be catered for, they

should be sparingly used. What is appetizing and palatable to one will be too hot and rich for another. Besides, an excess of condiments is apt to upset digestion.

(h) *Milk and eggs*.—We take the opportunity of saying a few words on these two articles of food because of the advice freely given to the consumptives 'drink plenty of milk', 'eat plenty of eggs'.

Milk is certainly a perfect food in the sense that in addition to containing all the proximate principles in proper proportions it is rich in mineral salts and vitamins. A quart of milk is equivalent in food value to a pound of lean meat or 8 eggs. It appears to be the ideal food for growing infants in dilutions suited to their relatively large stomachs. But for adults its bulk is too much for the digestive organs to handle easily. In our experience many patients, who drink a lot of milk for a quick cure, develop flatulent dyspepsia and diarrhoea. We must, therefore, prescribe just as much milk as they can easily digest. In our hospital we used to give 1 seer of milk daily. By cutting it down to $\frac{3}{4}$ seer of milk and $\frac{1}{2}$ pow of *dahi*, indigestion of our patients has been diminished.

Eggs are very hard to digest specially when they are taken raw. They should always be taken fried, scrambled or boiled. As eggs do not stimulate gastric juice and resist tryptic digestion, they should never be prescribed for patients with weak digestion. For Indian patients, not more than 2 eggs a day should be prescribed. Many cases of colicky pains and diarrhoea may be traced to eggs.

(h) *Variety*.—From what I have said, it is apparent that a good diet should be a mixed diet containing a variety of all elements and not a preponderance of one element or the other. It should be changed from meal to meal and day to day to prevent monotony. What is even more important is to see that the food is properly cooked and artistically served. The dishes should be spotlessly clean, and the food should look appetizing and attractive. Dettweiler who made a great success with his sanatorium used to say that his kitchen was his pharmacy.

The daily menu

A fixed weekly menu in an institution is better avoided, although it has many advantages from the administrative point of view. Patients will in such cases forecast the next day's menu and they will be anything but pleased when their forecast comes true.

As regards the number of meals, some experts recommend 5 to 7 meals or more a day which means that the patients would be eating and drinking almost throughout the day. Small frequent meals will not give the stomach and intestines the required rest and is sure to spoil the appetite. We prefer to give 4 meals a day—two principal meals at 11 a.m. and 7 p.m.—

one good meal at 7 a.m. and a light meal at 4 p.m.

At least half an hour's rest before each meal is of great importance. This improves the appetite. Smoking before meals causes temporary hyperglycæmia and spoils the appetite. If allowed, it should be advised after meals.

Fluids should be taken in between the meals and not with them; lemonade makes a good stimulating beverage.

The following is our daily menu for full diet for Indian patients:—

7 a.m.—Buttered toast; half-boiled, scrambled or poached egg; dalia or oatmeal porridge; milk.

11 a.m.—Rice, vegetables curried or boiled; dāl; meat curry or stew; chutney; *dahi*; lemon.

4 p.m.—Milk; fruit; sweets.

7 p.m.—Rice, chapati or luchi; vegetables fried or curried; dāl; fish curry; milk.

The following list shows the quantity of raw foodstuffs supplied per patient per day:—

Rice and atta .. 12 oz.	<i>Dahi</i> .. 4 oz.	Potatoes .. 6 oz.
Dāl .. 2 "	Egg .. One	Green vegetables 8 "
Meat .. 4 "	Fruit .. One	Sugar .. 2 "
Fish .. 2 "	Butter .. ½ oz.	Lemon .. One
Bread .. 3 "	Ghee .. 1 "	Salt and condi- ments as required.
Milk .. 24 "	Mustard oil 2 "	

The diet, as set forth above, contains approximately 125 gm. of protein, 130 gm. of fat and 470 gm. of carbohydrate and yields about 3,500 calories. The above calculations are based on the quantities of crude foodstuffs and, allowing 500 calories for preparation and cooking, the diet gives about 3,000 calories which is the standard requirement. The cost, excluding the pay of the cook, comes to about 12 annas per head per day.

Personal and economic factors

Unlike many Indian sanatoria, we supply food to all our patients. The advantage is that the patient's diet is entirely under our supervision and control and the patients are saved a lot of worry and bother. Whereas there is much to recommend in this system, we must not forget that there is nothing like a standard diet in this country which will suit the needs of all individuals. The nature of foods and the modes of cooking are as diverse as are the habits and customs of the people. They vary from province to province, district to district and no two households are alike in this respect. A patient who has been brought up on a particular kind of dietary and has developed his likes and dislikes will find it difficult to adapt himself to the standard menu and if he is sentimental, as many tuberculous patients are, he is sure to react by anorexia and digestive disturbances. In Bengal the diet is more homogeneous than in other provinces, and still we find it impossible to

cater for all tastes. In view of this difficulty, we are now building a few cottages with attached kitchens, where the patients will have facilities to cook for themselves.

Economic factors should also be taken into consideration. Tuberculosis is more prevalent among the poor, who are underfed in the normal circumstances of life. It is a disease which inflicts prolonged suffering and the unfortunate patients who, deprived of earning capacity, has often to depend, with his family, on the charity of others. To give him an impression that only 'plenty of eggs and milk' can cure him is to make him pessimistic about his future and drive him to desperation.

The question of prescribing a diet is, therefore, more or less an individual problem. The diet must be designed so as to suit the individual palate, the purse and the needs of the patients, remembering that tuberculosis requires just a little more food than is required for a healthy person. In private houses such individualization of diet is quite easy but in institutions it is more difficult. Here we have to think of the community which the institution mainly serves. For example, Frimley Sanatorium, which is under control of the Brompton Hospital, London, is principally meant for working-class people and their diet consists of the ordinary food that the people of this class can provide for themselves. The diet of Jadabpur is quite suitable for middle class Bengalees from whom the majority of our patients are derived. A common labourer placed on this diet will gain in weight rapidly, only to lose as rapidly when he returns to his home conditions.

Diet in other Indian sanatoria

With a view to ascertaining how the problem of diet is met in other Indian sanatoria and special hospitals, we sent out a questionnaire to the heads of 23 tuberculosis institutions. Unfortunately, only 5 replies were received. We give below in tabular form a summary of the relevant portions of the information received, including our own.

Special forms of diet

Although there is no specific diet for tuberculosis, experts have from time to time put forward special dietetic formulæ claiming for these remarkable therapeutic properties. We shall only mention two of these:—

(a) *Gerson's salt-free diet*.—Gerson of Germany, supported by Sauerbruch, has devised a new diet the principles of which are based on the 're-mineralization' theory and consist in—

(i) Elimination of common salt and addition of 'mineralogen' which is a mixture of many mineral salts, except chlorides.

(ii) Limitation of carbohydrates.

(iii) Diminution of animal proteins.

(iv) Use of vegetables and fruits in excess.

The majority of observers have failed to reproduce the good results claimed by its sponsors and at present the consensus of opinion is that the cost and the trouble are not worth undertaking, at least for pulmonary tuberculosis.

(b) *High caloric diet with insulin.*—Recently Vere Pearson and Day (Rolleston and Moncrieff, 1939) have advocated what they call 'high

8-15 p.m. followed in half an hour each time by 6 ounces of fruit drink (made of orange, lemon juice and sugar). During treatment the patients should have lumps of sugar or glucose drink handy so that on the slightest manifestation of hypoglycaemia (cold sweat, tremor, sinking feeling) they may help themselves and avert alarming symptoms.

Name of the institution	Percentage of patients who are supplied food from the Sanatorium kitchen	Number of meals per day	Nature of diet	Caloric value	Cost per patient per month	Opinion as to whether food should be supplied from the institution
Hill-side Sanatorium, Vengurla, Bombay.	50	5	Mixed diet suitable for rice eaters.	3,000	Rs. 15	Not necessarily. Cooking according to patients' liking but under medical supervision.
Royapetta Hospital, Madras City, and Tambaran Sanatorium, Madras.	100	6	Mixed diet specially suitable for South India.	..	15 to 20	The patients should be encouraged to have their own diet. Only milk, eggs and cumji to be supplied from the sanatorium.
Visrantipuram Sanatorium, Rajahmundry, Madras.	85	5	Do.	3,000	10	Sanatorium diet for those who cannot afford their own. Others to arrange according to their liking but under medical supervision.
S. J., T. B. Hospital, Delhi.	100	4	Mixed diet suitable for Indians.	..	30	The food should always be supplied by the sanatorium except in special cases.
Bel-air Sanatorium, Panchgani.	100	6	Mixed diet mainly European.	..	30	The food should be supplied from the sanatorium although the task is difficult. There are different cooks to cater for different communities.
Jadabpur T. B. Hospital.	98	4	(a) Indian diet specially suitable for Bengalees. (b) Mixed diet cooked differently for Anglo-Indian patients.	3,500	23 27	Yes, but the patients who cannot adapt themselves to hospital diet should be given facilities to cater for themselves under supervision.

caloric diet' combined with insulin. The underlying principle is to give carbohydrate in excess which helps in body building and in the language of the authors 'seems to coincide with a decreased destructiveness of the diseased process as witnessed by the decline of the sedimentation rate'. Insulin is combined 'to give the victim a real famished feeling' and to increase his carbohydrate intake.

The diet gives 4,000 calories and consists in giving extra dishes of carbohydrate preparations with the usual English lunch, tea and supper into the details of which I need not enter. Sixty units of insulin are given in 24 hours in 6 injections of 10 units. Three of the injections are given 20 to 30 minutes before the principal meals (8-30 a.m., 1-15 p.m., and 7 p.m.). The other 3 are given at 11 a.m., 1-45 p.m., and

The method is worth giving a trial in selected cases where the patients can afford it and are not putting on weight or gaining strength under the usual regimen. Half a dozen injections daily with risks of hypoglycaemia and insulin-sensitization render this method unsuitable for use in a mass scale.

Diet in complications

(i) *In hæmoptysis.*—Where the sputum is only streaked with blood or the hæmoptysis is slight, a little curtailment of the diet is all that is necessary. When the bleeding is active and severe, all solids should be withheld and all feeds should be served cold. Milk diet (2 to 3 pints a day) is usually recommended, but as pure milk does not agree with most patients it may

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A PSEUDO-TUBERCULOUS CONDITION ASSOCIATED WITH EOSINOPHILIA

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Introduction

AMONG many patients sent to the Union Mission Tuberculosis Sanatorium, Arogyavaram, diagnosed as having tuberculosis on account of

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conveniently be mixed with barley water or fruit juice, or served as ice cream. Gelatin given in the form of jelly is supposed to increase the coagulability of the blood and will be welcomed by many fastidious patients. Twenty-four hours after the bleeding has stopped pudding and porridge may be given even if the patient is bringing up clots. Resumption of ordinary diet should not be too long delayed, as absence of proper nourishment will only help in the spread of the disease.

(ii) *In tuberculous enteritis.*—A pure milk diet is recommended by some, but as milk does not agree with most of these patients it is better avoided. Dry milk preparations are, however, digested by many. Milk may also be given as *dahi* beaten up with water into a drink. Sometimes proprietary milk foods like Horlick's malted milk are better tolerated.

To avoid irritation of the ulcers, roughage should be reduced to a minimum. Strained vegetable soup and mashed potatoes serve the purpose well. We combine this with soft rice and lean fish. In no case should vegetable or fruit pips be allowed to be swallowed.

All experts agree in giving a high calcium and high vitamin diet. Food calcium is supplemented by calcium injections. Two ounces of orange juice with $\frac{1}{2}$ ounce of cod-liver oil or a few drops of adexolin or haliverol should be given 3 or 4 times daily. When oranges are not available tomatoes may be substituted.

(iii) *Laryngeal tuberculosis.*—Special dieting is called for only when there is dysphagia. When this condition develops, the throat should be anaesthetized with cocaine or orthoform before giving foods. When dysphagia is at all severe, pasty, semi-solid foods like porridge or pudding are swallowed with greater ease than either solids or liquids.

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the usual clinical symptoms associated with the disease, we find an increasing number who, after a thorough examination, we are convinced have no tuberculosis at all. In many of these patients a skiagram taken when the patient has first consulted his doctor has apparently confirmed the diagnosis—even to the point of signifying advanced disease.

In this paper we wish to call attention to a group of these patients where we think an error of diagnosis has been made chiefly on the interpretation of the *x*-ray picture. With the more frequent use of *x*-rays in the diagnosis of chest conditions, there is the possibility of a greater number of these people being wrongly condemned as tuberculous, a mistake we ourselves made in the earlier years of our work.

The first indication that we were facing what may be called a pseudo-tuberculous condition arose out of routine blood examinations of all our patients. Some of these showed a very high eosinophile count, even to over 90 per cent in the differential count. Very few of these had tubercle bacilli in the sputum, even when in more recent years we have used culture methods and stomach-wash examinations for the isolation of tubercle bacilli. These patients had almost all the usual symptoms of tuberculosis including fever, cough, sputum, loss of weight, chest pain and sometimes hæmoptysis, and by physical examination showed the signs usually taken as indicating tuberculosis. At the same time we began to notice that in many of these patients the skiagrams showed a fairly constant similarity. The condition is so typical that in the common parlance of our *x*-ray room it is called 'eosinophile lung'. This is characterized generally by an extensive mottling over both lung fields, usually evenly distributed; the size of the shadows is about 2 mm. and there is usually a certain amount of increased striation. In some patients the *x*-ray findings are more marked than in others. The general appearance is something similar to miliary tuberculosis or to silicosis.

Since we began to think these cases might not be tuberculous, we have done tuberculin reactions, and the majority of these have been negative. We have also studied changes in the differential count after subcutaneous injections of 'old tuberculin', and in most there was no increase in the *stabkernige* cells, a strong indication of the absence of an active tuberculous condition.

A further study of this condition showed that these patients had a good prognosis as judged by the discharge results and after-histories, beyond what could have been expected had the condition been tuberculous.

It has also been possible to check up some of these patients several years later, and they have still shown the same condition, especially in the *x*-ray picture and the blood picture, and sometimes also the clinical symptoms were unchanged.