UNIT 9 DIETARY MANAGEMENT OF NUTRITION RELATED DISORDERS AND ASSOCIATED PROBLEMS

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9.1 INTRODUCTION

Any disease is usually associated with changes in body structure and/or function. Such changes are a part of the disease process and result from specific abnormalities in the way the body handles substances. Very often infections initiate the disease process as you are probably aware.

In this unit and in the next we will take a close look at the ways in which we can use the diet as a therapeutic tool. In other words we will focus on two main areas in our discussion of each disease—identifying the problems and dietary solutions.

We must always remember, however, that the diet cannot cure most diseases. It can just help to hold them in check and prevent conditions from getting worse. There are, of course, certain diseases where dietary measures can result in a complete cure. You will clearly see this distinction emerge as you read through this unit and the next.

While studying dietary management look carefully at the problems associated with each disease. Then concentrate on how these problems can be overcome or at least controlled by using diet therapy.

In this unit we will be looking at dietary management of nutritional deficiency disorders and associated problems. To help you place things in perspective, an overview has been given at the beginning of the unit.

So, let's start!

Objectives

After studying this unit, you will be able to

- discuss the general principles in dietary management
- describe diet therapy in nutritional deficiency disorders and associated problems such as diarrhoea and fever
- explain the principles and practice of dietary management in diabetes and coronary heart disease

9.2 DIETARY MANAGEMENT OF DISEASE: CONCEPT AND APPLICATIONS IN COMMUNITY WORK

We have used the phrase "dietary management" several times during our discussion so far. What does this phrase mean? It refers to managing a disease condition using dietary means. *Dietary management involves making modifications in the diet and usually also involves changing the frequency of feeding.*

In the previous unit we talked about the ways in which the normal diet may be modified. Can you list them here?

We also mentioned that therapeutic diets are adaptations of the normal diet. They are planned to

- meet the requirements of specific conditions and
- maintain or restore good nutrition in such situations.

As a community educator, it is your role to inform people about the role of diet in disease. Our traditional systems of medicine such as *ayurveda* often specify dietary restrictions depending on the type of medicine prescribed. However, even if they are familiar with this relation between diet and drugs, people may not always recognize the importance of food alone as a means of therapy. Explaining the nature of an illness and then relating it to dietary change is important.

Sometimes it becomes difficult to convince people that a simple dietary change can help to cure or control a disease. It is expected that only pills, tablets, capsules or injections work wonders! You may have to think of innovative ways to tackle this problem. A very effective strategy is to actually show the benefits of diet therapy in the case of a community member. However, this may not always be feasible. You may have to substitute with story telling or using various communication aids which ... about in Course 3.

... in nutritional deficiency disorders.

9.3 DIET IN NUTRITIONAL DEFICIENCY DISORDERS

Diet has a central role in treatment of nutritional deficiency disorders. Food itself does not contain nutrients in high enough concentrations and so concentrated preparations of nutrients are administered orally, intravenously or intramuscularly. In addition underlying causes of deficiency such as hookworm infestation or a infection have to be treated as well, otherwise the problem cannot be cured. A checklist of signs and symptoms of nutritional deficiency disorders was given in Block 5 of Course 1.

Now look at Table 9.1. It summarizes the salient features of dietary management in some of the major nutritional deficiencies in our country namely PEM, vitamin A deficiency, anaemia and iodine deficiency disorders.

Table 9.1: Salient features of Dietary Management of Nutritional Deficiency Disorders

Disorder		Dietary management
PEM	—	High energy feeds
	—	Oral rehydration solution (ORS) in the case of mild to moderate diarrhoea and intravenous fluids in the case of severe diarrhoea
	—	A high-energy, high-protein diet when tolerance improves for solid foods
	—	Mineral and vitamin supplements
	—	Treatment of associated conditions
Anaemia	:	a) Iron deficiency: Adults and children over 20 kg: 200 mg ferrous sulphate three times a day in tablet form
		Smaller children: 30 mg/kg body weight day given in 3 doses as a freshly prepared solution. Daily tablet containing 1 mg folic acid. Vitamin B_{12} should also be given to prevent complications when B_{12} deficiency is treated with folate alone i.e. sensory disturbances, muscular weakness and in severe cases subacute combined degeneration of the spinal cord.
		Control of hookworm (or other infestations) and malaria also has to be undertaken where necessary.
Vitamin A Deficiency	:	*Emergencies:* Children with active corneal signs (corneal xerosis, corneal ulceration/keratomalacia), severely ill or malnourished children with any sigh of xerophthalmia or coming from a community where xerophthalmia occurs.
		Outpatients: Give immediately to children over 1 year—200,000 I.U. in oil (given orally) or water miscible preparation (given intramuscularly)
		Infants—half the dose for children over 1 year; examine the child again after one week.
		Inpatients: Immediately 100,000 I.U: Water miscible preparation given intramuscularly to all children
		2nd day, 100,000 I.U: oil solution orally to all children
		On discharge, 200,000 I.U Oil solution given orally to children over 1 year.
		On discharge, 100,000 I.U Oil solution given orally to infants
		Non-urgent cases:
	a)	For children with non-corneal signs of xerophthalmia (night blindness, conjunctival xerosis) or no severe illness but from community where xerophthalmia occurs.

		200,000 I.U oil solution: oral; children over 5 years. 100.000 I.U oil solution: oral; infants. The dose can be repeated every 6 months b) For mothers who have just delivered babies who plan to breast feed or pregnant women from a community where xerophthalmia occurs: 300,000 I.U oil solution: oral; single dose.
Iodine Deficiency Disorders	:	1. Consumption of iodized salt 2. Injection of iodized oil: The oil should be injected intramuscularly every 3-4 years in children and adults according to the following dose schedule. 0-12 months of age: 0.5 ml oil containing 37% by weight of iodine) 1-45 years: 1.0 ml containing 37% by weight of iodine) 3. Thyroxine preparations in the form of tablets

The table gives you the main features of therapy in the case of the four major nutritional deficiency disorders.

Check Your Progress Exercise 1

1) Suppose you want to convince the medical practitioner in a village to stock supplies of nutrients in various forms. What would you say?

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2) "Complete cure of nutritional deficiency disorders is not always possible."

Do you agree with this statement? Yes ☐ No ☐

Justify your answer.

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Severe PEM is often associated with dehydration and infection as we mentioned earlier. These are life threatening and have to be tackled immediately. If the patient can take in fluids orally, ORS solution is administered. ORS solution consists of the following salts dissolved in one litre of clean, boiled and cooled drinking water: Sodium chloride 3.5g; sodium bicarbonate 2.5g; potassium chloride 1.5g and glucose 20.0g. Between 50 and 100 ml of ORS solution per kg body weight depending on whether the dehydration is mild or moderate usually restores normal hydration. This amount should be given in the first 4-6 hours of treatment in small quantities every few minutes.

If the signs of dehydration disappear, maintenance therapy with ORS solution begins and is continued till the diarrhoea stops. For mild diarrhoea, 100 ml/kg body weight per day is adequate. In the case of severe diarrhoea, 2-4 times this amount may be needed. During maintenance therapy other fluids in addition to ORS can be offered.

Within 8-12 hours full rehydration should be achieved. By this time half strength milk preparations (i.e. half the strength normally taken by the infant) can be started for older children and adults. Water should be available throughout therapy with ORS solution.

What should be done in the case of children who vomit constantly? Or suppose the child cannot be fed orally? In such cases nasogastric feeding is tried. The volume of fluid to be given by nasogastric tube is 120 ml/kg body weight for the first 6 hours divided into 12 portions. One portion is, of course, given every half hour.

But what if this also fails? In such cases and in patients with severe dehydration intravenous fluid is the only answer to correct the dehydration. 70 ml/kg body weight of fluid is administered during the first three hours of treatment i.e. 30 ml in the first hour of treatment and the rest over the next two hours.

The fluid administered is Ringer's Lactate with the following composition:

Lactic acid	—	2.4 ml
Sodium hydroxide	—	As needed to adjust pH
Sodium chloride	—	6.0g
Potassium chloride	—	0.4g
Chloride	—	As needed to adjust volume to 1000 ml.

After the first three hours, therapy is continued only if ORS solution cannot be accepted by mouth or if signs of dehydration remain.

Now let us look at infections and their treatment. The severely malnourished child who does not have clear cut signs of specific infection should be administered a combination of procaine benzylpenicillin and ampicillin. When the causative agent is known or suspected, the antibiotic therapy of choice for that agent should be used.

Remember that treating underlying infections is crucial. An important point about severe infection in malnourished children is that fever may not be present. Instead there may be hypothermia i.e. low body temperature!

Let us assume at this point that we have successfully corrected the dehydration and that diarrhoea and vomiting have stopped. We can then follow this typical feeding schedule.

Days	Type of feed	No. of feeds per day
Day 1	Oral rehydration (ORS) (if there is still diarrhoea, vomiting or dehydration)	12
	Half strength milk feeds (if there is no diarrhoea, vomiting or dehydration)	12
Day 2	Half strength milk	12
Day 3	Half strength milk	8
Days 4, 5	Full strength milk feeds	8
Day 6 onwards	High energy milk feeds	6

Source: *Adapted from Table 3 in "The Treatment and Management of Severe Protein Energy Malnutrition", WHO, Geneva, 1981.*

The table clearly indicates how oral feeding can be started with small frequent feeds of dilute milk in the case of patients who are not dehydrated or in whom dehydration has been corrected. Why do you think this is done? The answer obviously is that such feeds would provide some energy and protein. Also since they are dilute they would not provoke either vomiting or diarrhoea. Look at the table again. Do you also notice the fact that the strength and volume of feeds is gradually increased while frequency of feeding is decreased?

As soon as the patient is able to tolerate milk feeds well, there is a need to switch to high energy feeds usually based on milk. Why? You are aware that PEM is associated with growth failure. Since the major problem is a shortage of energy and also protein, the feeds must provide these nutrients in sufficient amounts. When the child is given these milk feeds of high energy content the growth rate is astonishing, as the child seeks to catch up. This is, in fact, called catch up growth.

However, it is commonly observed that during the first week or so of high energy feeding malnourished patients may not gain weight. This is due to the body taking time to adjust—body composition itself alters in response. Such a situation is nothing to worry about.

Practical Notes 1 gives you some details about high energy feeds.

PRACTICAL NOTES 1

HIGH ENERGY FEEDS

High energy feeds and diets have traditionally been based on milk, sugar and oil. However, cereal and pulse combinations have been used in the preparation of high energy feeds in our country.

Let us first look at some milk based preparations suggested by WHO.

	Ingredients		
	Milk or Milk preparation	**Oil**	**Sugar**
Cow's or goat's milk	900	55	70
Buffalo's milk	800	30	65
Skimmed milk powder	90	85	65
Full cream milk powder	120	55	65
Evaporated milk	450	50	70
K-MIX 2	120	85	35

Source: The Treatment and Management of Severe Protein Energy Malnutrition, WHO, Geneva, 1981.

Notes:

i) *The milk/milk powder is mixed with oil and sugar and reconstituted with water so that total volume is 1000 ml.*

ii) *K-Mix 2 is a food mixture produced for and distributed by UNICEF for initiation of treatment of severe PEM.*

Its composition is as follows: Calcium caseinate 3 parts by weight, skimmed milk powder 5 parts by weight; sucrose 10 parts by weight and a vitamin A preparation, retinol palmitate 2.75 mg (5000 IU vitamin A) per 100 [illegible] dry mixture.

Check Your Progress Exercise 2

1) List two problems associated with PEM.

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2) What is the importance of rehabilitation and follow up in children with PEM?

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We have so far discussed how important dietary supplements can be in treating cases of PEM as well as other nutritional deficiency disorders. Gradually the child returns to the customary diet. However, care has to be taken to give a nutritious diet rich in energy and protein as well as vitamin and mineral sources.

Now how do we know that a child has fully recovered? A child can be considered fully recovered when he reaches the normal weight for his height or length (in the case of infants).

Regular follow-up of children who have recovered from severe PEM is strongly recommended since this:

a) reduces the risk of the child again getting PEM to which he has already been shown to be vulnerable.

b) allows completion of immunization schedules;

c) provides an opportunity for continuing education on child feeding and child rearing practices, family planning and personal hygiene.

These are guidelines laid down by WHO. It is also recommended that every child admitted for treatment of severe PEM should be followed up regularly until $2\frac{1}{2}$ years of age or in the case of older children for a minimum period of one year.

Let us now move on to the other nutritional disorders. Table 9.2 gives a quick summary of the salient features of management in the case of some vitamin and mineral deficiency disorders.

Table 9.2: Other Nutritional Deficiency Diseases: Management and Treatment

Deficiency disease	Nutrient involved	Management/Treatment
Beriberi	Thiamine	Thiamine supplements and B complex tablet
Pellagra	Niacin	Niacinamide supplement and B complex tablets
Ariboflavinosis	Riboflavin	Riboflavin supplement and B complex tablets
Rickets	Vitamin D	Cod liver oil preparations; vitamin D concentrates; exposure to sunlight

9.4 DIARRHOEA AND FEVER: DIETARY MANAGEMENT

You are already aware that both diarrhoea and fever are not diseases; they are symptoms of diseases. So they will not disappear completely unless the underlying cause is identified and treated. Otherwise we may continue to give "symptomatic treatment" with no permanent cure e.g. tablets for bringing down fever.

However we must emphasize that diarrhoea and fever need special attention in terms of dietary management. If this is not done the patient's condition can become quite serious. So let's begin with dietary management of diarrhoea.

DIARRHOEA

In Block 5, Course 1 you were introduced to the basic principles in dietary management of diarrhoea. In the previous section treatment and dietary management of diarrhoea in association with PEM was discussed.

It you recall, the major steps in controlling the ill effects of diarrhoea are

- correct dehydration
- maintain fluid and electrolyte balance

Dehydration occurs when body cells begin to lose far too much water. This is corrected using rehydration therapy and involves replacing the losses due to diarrhoea plus the losses of water and electrolyte from body cells. Once the water and electrolyte are replaced in the body cells (i.e. once symptoms of dehydration disappear) we have to continue giving fluid and electrolyte to replace the losses taking place because of continued diarrhoea. This is called maintenance therapy.

Do you remember the signs of dehydration? These are:

- little or no urine, the urine passed is of dark yellow colour
- sudden weight loss
- dry mouth
- sunken, tearless eyes
- sagging of the anterior fontanelle or "soft spot" on the head in the case of infants
- loss of elasticity of the skin

If dehydration is very severe the following signs usually appear:

- rapid, weak pulse
- fast, deep breathing

It is important to convince people that plenty of fluids should be given from the beginning: ORS is useful and should be given as frequently as possible in small sips. Infants and young children with diarrhoea need careful attention. Diarrhoea can be dangerous if not corrected soon.

Sometimes people feel that giving fluid will only make the diarrhoea more "watery". They may be convinced that fluid should actually be restricted. Breast feeding may also be stopped. This can kill the infant or young child and all efforts should be made to correct this notion. Breast feeding in particular must be encouraged during diarrhoea.

Diarrhoea with vomiting can be very dangerous because chances of dehydration are high.

Also you must remember to tell people when they must seek medical help. The situations which are difficult to tackle at home are:

- if diarrhoea lasts more than four days and is not getting better—or more than one day in a small child with severe diarrhoea
- if the person is dehydrated and getting worse
- if the child vomits everything he/she drinks or drinks nothing

- if the child begins to have fits (convulsions), or if the face and feet swell
- if the person was very sick, weak, or malnourished before the diarrhoea began (especially a little child or a very old person)
- if there is much blood in the stools, this can be dangerous even if there is little diarrhoea

FEVER

Fever, like diarrhoea is a symptom. It goes hand in hand with infections because it is one of the mechanisms evolved by the body to deal with infections. Fever, by definition, is an "elevation in body temperature above the normal which may occur in response to infection, inflammation, or unknown causes".

We have already mentioned that fever is associated with infections. However certain other factors such as antigen-antibody reactions (reaction involved in our immune system), malignancy or rejection of a graft can also cause fever.

Fevers may be of two types i.e. short duration/acute (e.g. typhoid) or long duration/ chronic (e.g. tuberculosis). Fever can also be intermittent as in the case of malaria.

To understand the principles of diet therapy we need to understand the metabolic changes in fever and infections. In general the higher the temperature and the longer the duration, the more the ill effects. For fever, the effects are:

- an increase in the metabolic rate amounting to 13 per cent for every degree celsius rise in body temperature (7% for each degree Fahrenheit). This pushes up energy needs.
- decreased glycogen stores and decreased stores of adipose tissue
- increased breakdown or catabolism of proteins especially in the case of diseases such as malaria, typhoid; this results in production of excess amounts of nitrogenous wastes—a burden on the kidneys
- accelerated loss of body water owing to increased perspiration and the excretion of body wastes
- increased excretion of sodium and potassium
- The metabolic consequences of infection include catabolism of proteins including body tissues
- fall in blood glucose; blood ketones are elevated and nitrogen excretion is reduced

The diet in fevers depends upon the kind of pathological condition and how severe the condition is. The length of convalescence—short or long—also makes a difference. The general dietary considerations focus on a high energy (especially high carbohydrate) and high protein diet. A liberal intake of fat is desirable but very rich foods are avoided because they cannot be easily digested. There has to be emphasis on sources of sodium and potassium as well as vitamins. B Complex vitamins are used up more in fever because of the higher metabolic rate. However patients on oral therapy with antibiotics and certain other drugs should be given extra B Complex vitamin supplements. This is because these drugs kill intestinal bacteria. These bacteria provide us useful amounts of vitamins since they synthesize some B-complex vitamins. In such cases taking B complex supplements is essential. Is there anything else? There is one very important point to add. Fluid and electrolyte intake must be liberal. Fluid intake should range from 2500 to 5000 ml daily. Why is this necessary? The reason is, of course, the need to make up for the heavy losses of fluid and electrolytes through the skin (as perspiration) and to allow for adequate volume of urine to get rid of the wastes.

It is important to give a bland diet including readily digested foods. Why do you think this is necessary? The answer is: to help in digestion and absorption and prevent any irritation.

Now, what about the consistency of food? In acute fever when the patient becomes very weak and even chewing is an exertion, a full fluid diet is given. Once the acute phase is over and the patient is recovering, a soft diet is given. Although fluid diets may be used initially there are some disadvantages. The first problem is the bulk which is out of all proportion to the nutrients supplied. Secondly, liquid diets sometimes increase abdominal distention to the point of discomfort. In such cases giving solid foods might be a better idea. In addition some patients feel nausea and may start vomiting when they take liquid foods. So as you would realize, it is a matter of taking a decision after considering the plus points as well as the minus points. However the usual decision is for giving *a full fluid diet in the acute phase of illnesses associated with high fever.*

The meal frequency is also an important point to consider. Small quantities of food at intervals of 2-3 hours will permit adequate nutrition without overtaxing the digestive system at any one time. With improvement, many patients consume more food if given three meals and a bed time feeding. This is also important because the patient's appetite is initially poor but improves gradually.

An example of a diet for a typhoid patient is as follows:

Milk	1000 ml
Barley water	1000 ml
Glucose	200 g
Cane sugar	100 g
Orange juice	500 ml
Dextrimaltose	200 g
Multivitamin tablet	One

What do you think such a diet emphasizes? Protein from milk, carbohydrate in various forms such as glucose, cane sugar, dextrimaltose, and of course vitamins. There is minimal emphasis on fat except that provided by milk.

Now let us turn our attention to diets for chronic fevers. In chronic fevers such as tuberculosis the fever is low and there is increased circulation. Since the illness is prolonged, tissue wasting takes place. So what kind of diet would be suitable? A high caloric, high protein diet is best.

A suitable dietary guideline is as follows:

Cereals	400 g
Pulses	50 g
Roots and tubers	100 g
Green leafy vegetables	200 g
Other vegetables	200 g
Eggs/paneer	2/60 g
Fruits	200 g
Milk and milk products	One litre
Fats and oils	25 g
Sugar	50 g
Tea or coffee	7/15 g

This hospital diet can be further enriched by addition of 100 g whole milk powder. At the community level this is useful for working out how the diet can be changed. Notice the emphasis on carbohydrates and protein sources.

It must be emphasized that tuberculosis patients have special nutritional needs. Calcium is needed to promote healing of tuberculosis lesions. This is why milk intake is important. In addition carotene is poorly converted to vitamin A and hence the diet should provide as much as possible of preformed vitamin A (retinol). Vitamin A supplements would be useful. Vitamin C or ascorbic acid deficiency is frequently present.

Drug therapy also creates problems. Isoniazid is an antagonist of Vitamin B_6. This means that isoniazid should be given with vitamin B_6 supplements or tablets.

Check Your Progress Exercise 3

1) Summarize the key features of diets for the following conditions.

a) Typhoid

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b) Tuberculosis

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Now let us add a few words on dietary management of infections. The principles we have already discussed are relevant in infections associated with fever. Restoration of body tissues is a major aim in treating infections and promoting recovery. High quality protein is needed for this. Carbohydrates must also be provided to spare protein for body building. Vitamin supplements are usually necessary. Enough intake of fluid and minerals such as potassium, magnesium and phosphorous is also important.

9.5 PRINCIPLES OF DIETARY MANAGEMENT IN CORONARY HEART DISEASE AND DIABETES

We used to think that diseases such as CHD and diabetes are common only in the West and not in India. Not any more! The incidence of these illnesses has been steadily rising over the past two or three decades. So we cannot afford to ignore them in community education programmes.

As you have learnt in Block 5, Course 1, these are diseases of affluence. In other words, they are more common in people who can afford to spend money on high fat and high sugar diets. Much of the principles of dietary management have already been explained in Unit 21 of Block 5 (Course 1). It would be useful it you go through the unit again at this stage.

We explained earlier that a poor diet is only one of the several causes of these diseases (of course we use the word "poor" here because eating too much also implies a poor or bad diet). Once the disease makes its appearance, however, dietary management is a vital tool in control. Both CHD and diabetes cannot be cured, as you know. Hence they stay with the person throughout life. As a result dietary changes became necessary.

In our subsequent discussion you would notice that we refer to hospital diets. Hospitalization is a must in the case of acute cases of CHD e.g.. heart attacks or myocardial infarction to use the technical term. Uncontrolled diabetes patients are usually hospitalized due to serious complications. In such cases it is important for the patient and his or her relatives to understand the nature of diet therapy. Equally important is what kind of dietary changes are necessary once the person returns home.

As you read the section, keep jotting down important points you would like to communicate to members of the community you work with.

CORONARY HEART DISEASE (CHD)

People consuming diets with high amounts of fat (particularly saturated fat) and cholesterol become increasingly prone to diseases of the cardiovascular system. Diet is, however, only one of several factors which are believed to cause cardiovascular problems. As a result of the disease process, fatty substances such as cholesterol compounds called esters, cholesterol and triglycerides are deposited on the inside walls of arteries. The deposit grows till it partially or completely blocks the lumen. This process is called atherosclerosis and is responsible for angina pectoris, myocardial infarction (both features of coronary heart disease) and cerebrovascular accidents (strokes).

The problems we will consider in some detail are as follows:

- Coronary heart disease and hyperlipidaemias
- Hypertension

CHD or coronary heart disease (i.e. problems such as angina pectoris and myocardial infarction) are associated in many patients with high levels of cholesterol and/or triglycerides in blood. This is what we call hyperlipidaemia. In addition it has been found that the fine balance between different forms of lipoprotein (lipid + protein compounds) affects the appearance of CHD in an individual. Have you heard about these lipoproteins? They actually constitute the transport system in the blood which carries lipids such as cholesterol and triylceride to various body parts. Certain lipoprotein forms such as low density lipoprotein (LDL) are the villains of the piece. They, in fact, promote atherosclerosis. On the other hand,the high density lipoproteins help in protecting the arteries from this adverse change.

Have you gone through this discussion carefully? On the basis of this information, can you think of the changes we should recommend in the diet of patients with angina or myocardial infraction?

Generally, diet therapy for these and other types of cardiovascular disorders is based on four simple rules:

1) Give the patient only the amount of food which would maintain weight. Putting on extra weight is dangerous. It the patient is overweight, prescribe a low calorie diet.
2) Plan the menu around those foods that are easy to digest.
3) Restrict stimulants such as tea, coffee, cocoa.
4) Limit sodium. If oedema is present, restrict sodium intake substantially.

The cardiac patient must often learn to accept new meal patterns and in many cases stick to a low fat diet. This is usually tough on the patient who feels that much of the pleasure in life is gone without what the patient considers "good food". Explaining the major objectives of hospital care is important. When you talk to a cardiac patient remember to tell him or her that the diet prescribed will

- give the heart a much needed rest
- prevent or eliminate accumulation of fluid in the body i.e. oedema
- maintain good nutrition

This would help to convince the patient and encourage acceptance of dietary management measures.

We earlier mentioned that obesity and overweight mean bad news for the heart. You can imagine how important this is for the cardiac patient! The following list gives you four reasons why the cardiac patient should not be obese:

- The heart must work harder as the body pushes and pulls the extra weight around.
- Fat deposits in the myocardium decrease efficiency of these muscles
- Abdominal fat interferes with movement of the diaphragm and thus with free action of the heart.

Let us now return to our discussion of dietary management of cardiovascular disorders.

In the acute phase of myocardial infarction or cardiac failure, the following diet is recommended according to the guidelines for standardized hospital diets specified by the Directorate General of Health Services.

A) 1000 Kcal Liquid Diet

Milk and milk products	730 ml
Egg white	One
Fruits for juice	200 g
Vegetables for soup	200 g
Cereal (for porridges, bread)	150 g
Sugar	20 g
Oil (unsaturated)	10 g

What are the salient features of such a diet? Yes, you are right. This is a diet which is

- low cholesterol
- low fat
- sodium restricted
- low calorie

Can you comment on the frequency of feeding which is desirable? To reduce stress on the body system, it is desirable to give frequent liquid feeds.

In severe myocardial infarction the following diet schedule may be adopted:

1-3 days: clear fluid diet consisting of fruit juice, coconut water and barley water containing glucose

3-6 days: Karell diet i.e. 800 ml milk given in four equal feeds i.e 200 ml every 4 hours (provided the patient can tolerate milk and has no abdominal distention)

7-10 days: Semiliquid diet providing 800-1000 kcal

11-14 days: Semi Solid diet providing 1200 kcal

The diet we described is suitable once the patient's condition has stabilized somewhat and the initial phase is over.

As the patient improves he is put on a maintenance diet.

B) Maintenance Diet—1800 kcal

Milk and milk products	750
Egg white	one
Paneer/meat/chicken	30/50 g
Fruit	200 g
Dal	25 g
Vegetables	400 g
Cereal	200 g
Sugar	20 g
Oil (unsaturated)	15 g

Care has to be taken to omit salt and foods in which salt or baking powder has been added.

Once the patient returns home he or she has to take special care in keeping the diet low in fat and if problems persist sodium as well as total intake of calories should be restricted according to need. Cholesterol sources such as egg yolk and glandular meats are not permitted as the following list tells you.

Foods not permitted

- Glandular meat e.g. kidney, liver, brain
- Whole milk, cream, ice cream, khoa and other preparations made of whole milk
- Butter, ghee, hydrogenated fat, coconut oil, palm oil
- Egg yolk, processed cheese

- Sweets of all kinds, cakes, pastries
- Dry nuts like almonds, walnut, groundnut, coconut
- Fried foods
- Cocoa and chocolate-based drinks
- All aerated waters
- Alcohol based beverages and other products
- High sodium foods (if there is oedema) e.g. bread, biscuits, eggs, cakes, pastries, canned vegetables, soups and fruits, salted or smoked fish, chicken, cheese, salted nuts, peanut butter, salted pickles, samosas and other savoury preparations.

We have just mentioned that sodium restriction might be because of oedema or retention of fluids due to the inability of the body to handle sodium normally. The degree of oedema will, of course, determine the degree of sodium restriction—mild, moderate or strict. More about this in the diets for hypertension. In addition to this fibre must be emphasized. Fibre has been shown to lower blood lipids.

THE KEY TO DIETARY MANAGEMENT OF CHD IS A LOW CHOLESTEROL, LOW FAT, HIGH FIBRE DIET WITH SODIUM RESTRICTION IF NECESSARY.

Hypertension as you already know. refers to high blood pressure, It has been found that hypertensive patients benefit from diets low in sodium. What exactly do we mean by the word 'low'? The normal diet contains about 3 to 6 g of sodium (3000 to 6000 mg sodium. Low sodium diets range from 200 to 300 mg right upto 2000-3000 mg depending on the degree of restriction. Now think a little. Are there any other diseases where we mentioned the need for sodium restriction? Yes, liver and kidney disorders and cardiac failure. This chart specifies the level of sodium prescribed for different types of disorders.

Degree of Sodium restriction	Level of Sodium permitted	Description of Diet	Disease condition
Extreme	200-300	No salt in cooking; selection of very low sodium foods	Cirrhosis of liver with ascites; severe congestive heart failure
Severe	500-700	No salt in cooking; selection of low sodium foods abdomen)	Severe congestive heart failure; severe renal disease with oedema in patients not on dialysis; cirrhosis with ascites (fluid in
Moderate	1000-1500	No salt in cooking; measured amounts of salt, salted bread and butter	Strong family history of hypertension or patients with borderline hypertension
Mild	2000-3000	Some salt can be be used in cooking but no salty foods permitted; no salt used at table	Maintenance diet in cardiac and renal diseases

Did you notice the restriction on salt? Table salt contributes most of the sodium in our diets. This is because it is a sodium compound—sodium chloride. Each gram of salt contains 400 mg sodium approximately. A teaspoon would contain as much as 2000 mg.

One important point to remember is that salt content of food is not just what we add to it in cooking. In fact salt finds it way into food as a natural component as well as a component used in manufacturing or preservation of food products. Convenience foods are particularly high in sodium. Thus canned foods, instant mixes, ready to serve meals, pickles/preserves/relishes, sauces are sodium-rich. Foods with added baking power are high sodium foods because baking powder is a sodium salt. Foods are not the only offenders. Several drugs are available in the market as sodium salts. It is important to look for these hidden sodium sources.

Can you imagine eating food without salt? Try it once. It's so difficult to add the spice back to low sodium food. The answer is, in fact, mild spices and herbs such as aniseed, bay leaf, cardamom, cloves, cinnamon, cumin, curry leaves, garlic, ginger, lemon juice, mace, mint, pepper, saffron, sesame seeds, vinegar, parsley.

Here is a checklist of foods and food products rich in sodium to help you remember.

Foods		
Milk	Poultry	Turnips
Eggs	Fish	Spinach
Cheese	Beet greens	
Meat	Carrots	
Food Products		
Baking powder		Pickles and relishes
Instant mixes		Prepared mustard
Nuts, salted peanut butter		Potato chips
Salted butter		Cheese
Canned soups		Mayonnaise
Jellies preserved with sodium benzoate		Prepared meats
		Shellfish

If the patient is put on diuretics, high potassium foods such as fruits should be emphasized.

In cases of severe hypertension that do not respond to usual dietary measures the Kempner diet has been prescribed. The diet consists of rice, fruit and sugar. The Kempner Diet is cholesterol free and contains only 5 g fat and is high in carbohydrate and low in sodium. The diet is deficient in several nutrients and is stopped after a few days when blood pressure begins to drop.

HYPERTENSIVES ARE RECOMMENDED LOW SODIUM, LOW CHOLESTEROL DIETS

Check Your Progress Exercise 4

1) Read the following case study carefully.

One week ago Mr. Murli was admitted to the Intensive Care Unit of a Hospital with myocardial infarction. He is 40 years old and 10 kg overweight. His job takes him to business lunches and dinners and he loves coffee. Mr. Murli's blood pressure was 166/100 on admission to the ICU but later stabilized at 140/88. Blood lipids, cholesterol and triglycerides are high. Mr Murli has been treating himself for an indigestion problem with antacid tables.

Now answer the following question.

a) What kind of diet should be recommended for Mr. Murli after the acute phase is over?

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b) Comment on the changes he would have to make in his lifestyle, dietary patterns and use of drugs such as antacids when he gets back home.

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2) Match the following:

	Diet		**Disease**
i)	Kempner	a)	Peptic ulcer
ii)	Karell	b)	Cardiac failure
iii)	Sippy	c)	Hypertension
		d)	Myocardial infarction

3) The sodium restricted diet is quite tasteless. Suggest flavours that you could use for a savoury snack.

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DIABETES

We will now discuses dietary management of diabetes in some detail. You are aware that insulin is secreted by the Islets of Langerhans in the pancreas. Insulin plays a crucial role in carbohydrate metabolism. It helps glucose to enter cells and be used by them to generate energy In diabetes this key hormone is either secreted in very small amounts or is almost absent (Insulin dependent diabetes mellitus) or is secreted in moderate or even large amounts but in a form which is not as effective (non-insulin dependent diabetes mellitus). You may also be aware that uncontrolled diabetes can be fatal. With some care and a disciplined lifestyle it is possible to live a near normal life inspite of diabetes.

In the case of diabetes it is important to relate symptoms and clinical findings to the disease process itself. The symptoms and clinical findings and the reasons for their appearance are summarized in the following discussion.

SYMPTOMS

- *Polyuria*: A frequent and abnormally large amount of urine results when glucose passes through the kidneys in excessive amounts.
- *Polydipsia*: The loss of fluid through polyuria causes excessive thirst.
- *Dehydration*: When polyuria exists and fluid replacement is insufficient, the body becomes "dry".
- *Polyphagia*: When carbohydrates are not metabolized properly, the body cells are starved of nourishment. In effct they are "hungry"in the midst of plenty because the individual continually eats without satisfying the body.
- *General weakness and weight loss*: Carbohydrates are major sources of energy. When they cannot be utilized, there is increased breakdown of fats. Usually even this is not good enough and proteins—including tissue proteins—are broken down to release energy.
- *Decreased ability of tissue to heal*: The abnormally high sugar content of the blood means excellent conditions for growth of bacteria. In addition the cells are starved of energy and cannot function properly to fight infection or repair injured tissues.

  Degenerative changes: Peripheral neuritis, retinitis, coronary heart disease, atherosclerosis in uncontrolled diabetes.

  Ketosis: Byproducts of fat metabolism called ketone bodies accumulate in blood because of the incomplete breakdown of fat. This happens because of the mobilization of large amounts of fat due to inability to utilize carbohydrate. Body tolerance for ketones is limited and excessive ketones result in coma.

CLINICAL FINDINGS

Hyperglycaemia: High blood glucose i.e. over 120 mg per 100 ml blood in a fasting sample

Glycosuria: Appearance of sugar (glucose) in urine

Ketonuria: Excretion of ketone bodies in urine

We have just discussed the major problems encountered in diabetes. This should help you understand the dietary measures required.

DIETARY MANAGEMENT

Diabetes is treated using

- diet alone OR
- diet + oral hypoglycaemic drugs OR
- diet + insulin

As you can see, diet is a centre pillar in therapy for diabetes. The goals for dietary management of diabetes are to:

- improve the overall health of the patient by attaining and maintaining optimum nutrition
- attain and maintain ideal body weight
- provide for normal physical growth in the child and for adequate nutrition during pregnancy and lactation
- maintain blood glucose as near the normal physiological range as possible
- prevent or delay development of chronic complications of diabetes: cardiovascular, renal, retinal and neurological
- modify the diet as required for treating and preventing complications of diabetes and associated diseases

In a nutshell the salient features of diets for diabetes mellitus are:

attainment and maintenance of desirable body weight according to age, sex, activity level; intake of complex carbohydrates (starches) rather than simple carbohydrate (sugars); high fibre content in the diet and intake of polyunsaturated fats in preference to saturated fats.

The first step is to calculate the reeommended calorie intake. The following formulae are useful and are based on desirable weight for a particular age, sex and activity level.

Sedentary worker	:	Desirable weight (kg) x 30 kcal
Moderate worker	:	Desirable weight (kg) x 40 kcal
Heavy worker	:	Desirable weight (kg) x 50 kcal

For individuals above the age of 40 years calorie intake is reduced in the following manner:

40-49 years	by	5%
50-59 years	by	10%
60-69 years	by	20%
Over 70 years	by	30%

Further, if the person requires to lose weight at the rate of about 1 kg in 2 weeks, calorie intake needs to be reduced by 500 kcal/day. However we must remember never to reduce enegy intake lower than 1200 kcal for women and 1500 kcal for men.

Here are some diabetic diets with specific points to remember according to the guidelines for standardized hospitel diets laid down by DGHS.

	1200 Kcal.	1500 Kcal.	1800 Kcal.	2000 Kcal.	2500 Kcal.
Cereals and millets	125 g.	175 g	225 g.	225 g.	350 g.
Pulses and legumes	50 g.	50 g.	50 g.	75 g.	75 g.
Milk and milk products	500 ml.	500 ml.	750 ml.	750 ml.	750 ml.
Green vegetables	200 g.	200 g.	200 g.	200 g.	200 g.
Other vegetables	200 g.	200 g.	200 g.	200 g.	200 g.
Fruits	1 portion	1 portion	1 portion	1 portion	2 portions
Paneer/egg	30 g./one	30 g./one	30 g./one	30 g./one	30 g./one
Oil	10 g.	15 g.	15 g.	20 g.	25 g.
Sugar	—	—	—	—	—

Foods allowed liberally:

Green leafy vegetables, vegetable salads without oil dressings
Lime, lemonade, clear soups

Notes: 1) Roasted bengal gram and fenugreek seeds can be included in the diet as these have been shown to have a hypoglycaemic effect.

2) One portion of fruit providing 10 g. carbohydrate.

Black coffee or tea without milk or with day's allowance
Chutneys and pickles without oil.
Pepper and zeera water,
Jamun phalsa, raspberry.

Foods to avoid:

Soft drinks, all beverages not listed above
Alcohol and wines,
Fried foods,
Sugar, honey, jams, sweets, cakes, pastries

Note: Potatoes, colocasia, yam, mangoes, banana may be consumed as food alternatives, in restricted amounts.

Check Your Progress Exercise 5

1) List the major considerations in dietary management of diabetes.

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9.6 LET US SUM UP

This unit make the following major points:

- As a community educator, it is your role to inform people about the role of diet in disease.
- Nutritional deficiency disorders are treated using high energy and protein feeds (e.g. PEM) or using nutrient supplements which supply particular nutrients in high doses (e.g. vitamin A).
- Problems associated with nutritional deficiency disorders such as fever and diarrhoea must be given special attention and appropriate dietary modifications need to be made.
- A low fat intake and elimination of cholesterol sources in the diet is recommended for CHD patients as well as relatives of such patients who are at—risk individuals
- Salt restriction is recommended in mild hypertension. For moderate and severe cases no salt is permitted in food and sodium levels are kept in check in the diet.
- Diabetes should keep to a low fat, high fibre preferably sugar free diet. Sugar is permitted only if adequate adjustments can be made in insulin or drug dosage and if the condition is relatively mild.

9.7 GLOSSARY

Oral hypoglycaemic drug	A drug given orally which can bring down blood glucose levels
Maintenance diet	A diet used after the acute phase of an ailment is over when the patient has to be kept in a stable condition without deterioration in health.

9.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

1) "There are many people in your village who suffer from nutritional deficiencies. You are an expert yourself—you must have noticed how ________ , ________ and ________ are showing signs of vitamin deficiencies (indicate names of people for example). If both of us do a detailed study or survey we may find cases of other problems as well. So I think it would be good if we keep supplies of nutrients in various forms. Wouldn't you agree?"

   This is only one possible response. You may give other alternatives.

2) Yes. If the disorder is already well established and is associated with permanent adverse effects, these cannot be reversed so complete cure is not possible. For example in a patient with advanced keratomalacia we may not be able to prevent blindness by giving vitamin A doses. Only further deterioration can be prevented.

Check Your Progress Exercise 2

1) Diarrhoea, fever, worm infestations.
2) A child with PEM may be completely cured. However the child returns to the environment he or she came from with all the associated factors that caused the disease to appear. Giving the child an opportunity to remain in a rehabilitation centre can help the mother and child to adapt to conditions in the community. Regular follow up can indicate whether the child's health is being maintained and how to prevent reappearance of the disorder.

Check Your Progress Exercise 3

1. (a) Full fluid, high energy, high protein diet in acute phase; soft high energy high protein diet in convalescence. Diet rich in water, vitamins and minerals. Fat is restricted.

   (b) Diet rich in energy and protein. Calcium, vitamin A, vitamin C intake must be emphasized.

Check Your Progress Exercise 4

1. (a) Mr. Murli must cut down on fat intake and reduce intake of carlories as well to reduce weight. Cholesterol sources need to be avoided and salt restriction would be required.

   (b) Mr. Murli must try to restrict intake at business lunches and dinners. He could take salads (without rich dressings) and continental fish or meat preparations without rich sauces. Small frequent meals must be taken so that there is no problem of indigestion. Mild exercise such as walking may help to reduce weight. Antacids must not be taken because they are sodium salts.

2. (i)— d; (ii) — c; (iii) — a

3. One idea could be to use a mixture of herbs and pepper. You could think of other alternatives.

Check Your Progress Exercise 5

1.
   - Restriction of simple carbohydrates, avoiding sugar and sugar-rich items.
   - Emphasis on complex cabohydrates (starches) and high fibre intake
   - Restriction of fat; emphasis on polyunsaturated fats
   - Attainment of ideal body weight (if overweight) is very important
   - Close connection of diet pattern and amounts consumed with insulin or drug dosage.