YBN University, Ranchi

Proteins

Learning objectives At the end of this unit, students will be able to: ƒ Understand the importance of proteins

Describe the digestion and absorption

Understand the signs and symptoms of protein energy malnutrition

Explain criteria for referral of PEM cases to the nearest health facility. Proteins have long been recognized as fundamental structural elements of every cell of the body. Specific proteins and protein derivatives have been recognized as functional elements in certain specialized cells glandular secretion, enzymes and hormones. Proteins in natural foods differ widely in the number and the proportion of the 22 or more amino acids. A good quality or a complete protein is the one that supplies all the essential amino acids in sufficient quantities and in proper ratio for normal growth and maintenance. In general all proteins from animal source, such as meat, poultry, fish, eggs, milk and milk products provide good quality proteins.

Source of proteins

Milk and milk products such as cheese, ice cream all derive their protein from milk. Š Meat, poultry, and fish are all forms of animal tissues

Eggs are in a class by themselves a protein food of high nutritive value. ƒ Vegetables are poor source of protein. ƒ Legumes provide more than 4 or 6 percent. They are listed as meat alternates in the four-food group chart because they provide one of the better quality plant proteins. ƒ Bread and cereals make an important contribution to the protein of the diet, the protein of uncooked grain ranges 7 to 14 percent. Digestion and absorption of protein The digestion of protein in the alimentary tract is accomplished by the action of several proteolytic enzymes in the gastric, pancreatic and intestinal juices. Any of these enzymes that have the power to attack native proteins must be secreted in an inactive form to prevent damage to the tissues where they are formed. Types of enzymes ƒ Pepsinogen is secreted by the gastric juice and activated by the Hydrochloric acid ƒ Trypsinogen is secreted by pancreatic juice and activated by entropeptidase

Chemotrypsinogen is secreted by pancreatic juice and activated by the active tripsin f Peptidase intestinal juice Table 3 Summary of protein digestion Site of action Protein Enzyme End – Product Stomach - Small intestine Protein polypeptides Polypeptide dipeptides Pepsin in acid Trypsin chemotrypsin Peptidase (secreted by mucosal cells of small intestine Enter portal blood Liver Body tissues Large peptide poly peptides Polypeptides Dipepetides Amino acids Peptides Amino acids Portal.

The Amino Acid Pool

The amino acids from the food or from the body tissues enter a common pool, which is drawn upon for the synthesis of proteins, hormones, enzymes, blood protein and nucleic acids, or some of the amino acids are degraded for energy needs. Proteins are absorbed as amino acids. Ideally, they are used to build or maintain body proteins. If carbohydrates and fats are not meeting the energy needs of the body, amino acids can be used to provide energy. Danger of the weaning period The weaning period is fraught with dangers for a large proportion of the world's children and nutritional disorders are common at this time of life. In the West a general awareness of the nutritional needs of the weanling, together with the ability of the average family to provide the necessary foods, have helped to remove most of the dangers of the weaning period. In the peasant society of developing countries, however, parents are generally are unaware of the dietary needs of children, and several customs associated with weaning are likely to give rise to nutritional deficiencies. In the traditional society of Ethiopia, weaning is commonly abrupt and unplanned. Often it is brought by the occurrence of another.

pregnancy.

There are superstitions and beliefs concerning the effects of another pregnancy on the quality of the breast milk. It is believed that the heat from the womb "poisons" the milk in the breast. They also think that the baby in the womb is jealous of the older sibling on the breast. It is therefore considered urgent that the child should be taken off the breast immediately. The mother may apply potions (bitter material) to the nipples so that when the child takes the breast the sharp bitter taste makes him/her give up suckling. The child has very close relationship with the mother, the mother takes him/her back wherever and whenever she goes to fetch water or to bring firewood, the child has also access to breast milk on demand. The child sleeps on her back, but this intimacy will be interrupted when the mother knows that she is pregnant for the subsequent child. This is a

psychological blow for the child and causes poor appetite and as the result the child can develop protein energy malnutrition. Protein energy malnutrition (PEM) PEM is today the most serious nutritional problem in Africa and other developing countries. Its two clinical forms are Kwashiorkor and Marasmus. The diseases occur mostly in children between one and three years of age, after they have been taken of the breast Although there is no final clarity about the etiology of kwashiorkor in biomedical terms, it is nevertheless, clear that it is related to nutritional deficiencies. Therefore, all factors that could possibly contribute to the child malnutrition in general should be avoided. These include:

Š Seasonal food shortage

Š Unfavorable family condition,

Š Inadequate water supply and sanitary facilities,

Š Certain traditional attitudes during pregnancy, prenatal period, breast-feeding and weaning periods, and Š All infectious diseases, which generally reduce immunity. Other diseases may sometime play an important role in precipitating the onset of kwashiorkor in already malnourished child. E.g. ƒ Gastrointestinal tract infection

ƒ Diarrhea

ƒ Intestinal worms share the diet and cause other ill- health and poor appetite

ƒ Constipation

ƒ Childhood diseases such as measles, whooping cough, etc, Signs and symptoms of kwashiorkor

ƒ Growth failure occurs always

ƒ Wasting of muscle is also typical but may not be evident because of edema.

There may be mental change

ƒ Hair and skin color change

ƒ Diarrhea and vomiting

ƒ Sign of other micronutrient deficiencies Skin changes Mild: localized hyper pigmentation and skin cracks Moderate: skin peals off, desquamation. Severe: superficial ulceration, bleeding Hair

changes Hair changes are classified into three categories Mild: beginning of visible color and structural changes Moderate: color and structural changes, loss of hair Severe: loss of hair together with ulceration of head Physiological functions of the various systems are markedly disturbed with ƒ Diarrhea ƒ Electrolyte disturbance ƒ Circulatory insufficiency ƒ Metabolic imbalance ƒ Poor renal functions Hence the child with kwashiorkor should be thought of as an emergency in need of referral to the nearest health facility.