The Volgograd State Medical University
The Chair of hygiene and ecology

Lecture:

Nutrition and human health.

Scientific basis of a healthy diet. Characterization of physiological nutritional standards.

Nutritional status as an indicator of health, assessment criteria.

- Dietary nutrition- nutrition prescribed for clinical or preventive purposes to all sick persons.

- Clinical preventive nutrition- nutrition which is to be recommended to all people engaged in extremely heavy activity and for people working in bad environment conditions

ALIMENTARY DISEASES

– disorders related to insufficient or excessive consumption of essential nutrient components of food, or caused by disturbances of there absorption

The ALIMENTARY DISEASES are obesity, dystrophy, rickets, kwashiorkor, etc.

Why the problem of rational nutrition is especially important nowadays?

Civilization and engineering progress provide considerable changes in human lifestyles:
- reduced motor activity;
- increased emotional and stress loads
- decreased period of rest (i.e. sleeping),
- increased period of keeping awake.

Eating habits have changed considerably. Nowadays we can eat the food when we stand, walk, talk, read a book, or watch TV.

There are a great number of prepared raw foods nowadays which do not have natural qualities (tinned goods, macaroni, etc.).

The variety of foods eaten in a daily intake has become worse.

There are a great number of prepared raw foods & fast foods in the diet of a modern person which contribute appreciable amounts of energy (i.e. kilocalories). For example, sandwiches (bread, butter, and cheese) contribute 600 kcal.

A modern person drinks too little water. It breaks down a smooth work of the gastro-intestinal tract.

Factors that affect food choice

We often select a food to eat automatically, without thought. But in fact, our choices are complex events involving the interactions of a multitude of factors.

Rational nutrition should meet the following requirements or principals:

1. The quantitative adequacy of nutrition

2. The qualitative adequate of nutrition

3. Daily diet regime

4. The food should have good organoleptic indicators

5. Harmlessness and safety of food

The quantitative adequacy of nutrition

A total amount of kilocalories in the daily intake should meet energy expenditure (energy uses)

Energy expenditure

- for maintenance of the basal metabolic rate (BMR);
- physical activity;
- energy required during digestion and absorption of food (special dynamic effect)

The qualitative adequate of nutrition

A daily persons intake must contain all essential nutrients such as proteins, fats, carbohydrates, vitamins, minerals.

All the nutrients, especially proteins, fats and carbohydrates, are to be present in a person's diet in rational and adequate relations. This relation enables nutrients provide the most of it's biological effect.

- **Nutriens** - any substances in food that the body can use to obtain energy, synthesize tissues, or regulate functions.

- **Essential nutrients** - substances that must be obtained in the diet because the body ether cannot make them or cannot make adequate amounts of them.
- Essential nutrients include proteins, essential component of fats, vitamins, minerals and water.

There are more than 60 essential nutrients

Essential nutrients

They are usually referred to as essential due to their properties.

- Most essential nutrients cannot be synthesized in the human body or they are synthesized in small quantities.
- Most essential nutrients cannot be preserved (stored) in the body. Thus, long-term under-consumption of nutrients or even deprivation of essential substances cannot be compensated for the stores of the body.
- If one develops nutrient deficiency, the symptoms occur in a short time. In our everyday life it is rather easy to follow recommended dietary guidelines if we eat a variety of foods every week (at least 30-32 food items).

The relation of proteins to fats and to carbohydrates

proteins : fats :carbohydrates	
1,2 : 1 : 4,6	for young
1 : 0,8 : 3	for persons engaged in mental activity
1 : 1 : 5	for persons engaged in heavy activity and sportsmens.

Daily diet regime
(daily food summary)

- **Food summary is regularly and frequency of eating food, intervals between meals, as well as qualitative and quantities evaluation of the amounts of food items at each meal.**

- **Distribute the energy value of the food items according to the meals:**

20-25% for breakfast,

35-40% for dinner,

10-15% for snack,

25-30% for supper

The food should have good organoleptic indicators

- Appreciable color, smell, taste, temperature, appearance, etc.

- The food is to be appetizing as well,
- It should be well absorbed and digested in the digestive tract,
- A daily volume of food should provide a feeling of satiety

Harmlessness and safety of food

- The food we select to eat is to be of high quality, should not contain transmitting agents and macrobiotics and non-macrobiotic toxins

The working people are divided into the following groups:

- **Ist group. This group includes brainworkers engaged in mental activity (medical staff, except surgeons, scientific workers, teachers, etc.)**
- **IInd group. This group includes persons engaged in light physical activity (nurses, salesmen, hospital attendants, etc.).**
- **IIId group. This group includes workers engaged in moderate activity (surgeons, drivers, etc.).**
- **IVth group. This group includes workers engaged in heavy activity (builders, farmers, etc.).**
- **Vth group. This group includes people engaged in extremely heavy activity (steel founders, Dockers, etc.). Sportsmen are also included in this group.**

On planning diet guidelines for different groups of people, one should take into consideration sex (males & females)of individuals.

The basal metabolism of women by 10% less then that of men. That is why energy requirements of women are on an average 15% less than those of men.

On planning the standards of nutrition age of the individuals must be also considered.

One can distinguish the following age groups:

1. Children - up to 17 years (11 groups).
2. Three groups of working people: 18-29, 30-39, 40-59.
3. After 60 years – the following groups: 60-74 years, 75-90 years and after 90 years.

The grounds for distinguishing the age groups are some age peculiarities of metabolic processes.

- On planning the diet for people of 18-60 years old, an average total body weight is accepted: 70 kg – for men, 60 kg – for women.

NUTRITIONAL STATUS

- is usually referred to an organism status, which have been formed under the influence of eating habits of an individual, conditions of eating food, and genetic peculiarities of metabolic processes in the human body.

Types of nutritional status:

1 .Ordinary nutritional status

2. Optimum nutritional status

3. Excessive nutritional status

4. Insufficient nutritional status

(inadequate, premorbid and morbid)

Ordinary nutritional status

- It is the status of nutrition by which there are no deviations of the body structure and dysfunctions of the human body, and there are adaptation properties which provide the existent of the individual in ordinary conditions.

Optimum nutritional statUS

It is the status of nutrition by which there are no deviations of the body structure and dysfunctions of the human body, and there are adaptation properties which allow them to survive in extraordinary situations.

Excessive nutritional status

It is the status of nutrition by which there are no deviations of the body structure and dysfunctions of the human body, and decrease of adaptation properties

Insufficient nutritional status

It is the status of nutrition by which there are no deviations of the body structure and dysfunctions of the human body, and decrease of adaptation properties.

Inadequate. It is the status of nutrition by which the clinical symptoms of the food deficiency do not develop.

Premorbid. It is the status of nutrition which is characterize by microsimptoms of deficiency disorders, decreased activity, adapting properties, and resistance of human body.

Morbid It is the status of nutrition which is characterize by deviations of the body structure and dysfunctions of the human body, syndrome of the deficiency disorder

Indications for evaluation nutritional status:

- 1. Somatometric indications (height of the body, weight of the body, chest circumference, skin fold thickness, weight & height indices.

- It is considered to be normal if your body weight is **10%** more than the desirable weight;
- If your body weight is **10-20%** less than the desirable, it is considered slightly insufficient;
- if your body weight is **20-30%** less than the desirable, it is considered moderate insufficient;
- if your body weight is **30%** less than the desirable, it is considered that your weight is greatly deficient.

- If you have excessive weight, and your weight is **10-20%** more than the desirable, it is considered that excessive;
- If your body weight is **20%** more than the desirable weight, it is considered that you have obesity.

Body weight is closely related to some other anthropometric indicators such as height of the body.

Quite often one can use Ketle´s index. The experts of the WHO (World Health Organization) recommend to use this index for evaluation of nutritional status of an individual.

Ketle´s index can be calculated using the following equation:

Ketle´s index = Weight in kg : Height in m.

In other words, body weight of a person (kg) is divided by body height of a person (m).

Desirable Ketle´s index is 20-25 kg/m^2.

If Ketle´s index is more than 25, it means that you have the 1^{st} stage of obesity.

The foods include the following components:

1. **Nutrients.** Nutrients are subdivided into:

   proteins, fats, carbohydrates, vitamins, minerals, water;

   flavoring substances such as organic acids, ethers, coloring substances, aromatic compounds.

2. **Antinutrient substances** which include antiaminoacids, antiminerals, antivitamins, etc.

3. **Foreign substances** (additives).