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Образовательная программа специальности 31.05.01 Лечебное дело (специалитет)

УЧЕБНО-МЕТОДИЧЕСКИЙ КОМПЛЕКС ДИСЦИПЛИНЫ
«ГИГИЕНА»

**ТЕМА:
« HYGIENIC EVALUATION OF NUTRITION.
NUTRITION-RELATED DISEASES, THEIR CAUSES AND PREVENTION
(part 1,2)»**

Methodical recommendations to the lesson
for students in the specialty 31.05.01 "General Medicine"

г. Волгоград, 2020 г.

The motivational description of the theme:

A balanced diet fosters normal growth and development, helps to maintain a high efficiency and productivity, increases life expectancy and promotes resistance to various unfavorable somatic factors.

The doctor must be aware of the problems associated with the impact of diet on the health of individuals and the population as a whole. Most nutrition-related diseases are manageable. Nutrition plays an important role in the prevention of many chronic and noninfectious diseases in a population. Implementation of the principles of a balanced diet requires both the support of the state and that of every individual. All must strive to lead a healthy lifestyle and learn the practical skills of healthy nutrition. The doctor plays a crucial role in the dissemination of these skills and knowledge.

The objective: To learn the principles of rational nutrition, to learn the ways of preventing nutrition-related diseases, to learn how to calculate certain physiological energy and nutritional requirements of the body. To be able to determine and tabulate human energy expenditure using the time-keeping method. To learn the recommended standards for physiological energy and nutritional requirements.

Students' independent classroom activities

1. Solving case problems.
2. Determining and tabulating human energy expenditure using time-keeping data.
3. Determining the physiological energy and nutritional requirements of a student using the "Standard physiological requirements for energy and nutrients for different groups in the Russian Federation."
4. Students' presentations.

Self-study task:

1. Rational nutrition: Definition. The principles of rational nutrition.
2. Principles of standardization of nutritional needs of various population groups.
3. Standard physiological requirements for energy and nutrients.
4. Classification of nutrition-related diseases.
5. Prevention of nutrition-related noninfectious diseases.

Plan of students' independent activities

1. Case problem. The solution of case problems should be reported in writing.
2. Determining and tabulating human energy expenditure using time-keeping data according to the following algorithm:
 - Chronometry of the various activities carried out for a period of 24 hrs;
 - Drawing a chronogram of the day;
 - Calculating the energy consumption for particular activities;
 - Calculating the total energy consumption for all activities carried out within 24 hrs;

- Calculating unaccounted energy expenditure (5% of total energy consumption);
- Calculating energy consumption due to specific dynamic action of food (10-15% of the basal metabolic rate);
- Calculating daily energy expenditure (needs).

3. Determination of the physiological energy and nutritional requirements of a student using the "Standard physiological requirements for energy and nutrients for different groups in the Russian Federation" (Guidelines. 2.3.1.2432-08 MR).

Reference Information

Term descriptions

NUTRITION-RELATED DISEASES are diseases of microbial or other nature associated with consumed foods.

BASAL METABOLIC RATE is the minimum amount of energy needed for vital somatic processes to occur (physiological and biochemical processes, functioning of organs and systems of the body) in a state of thermal comfort, complete physical and mental rest and on an empty stomach. For people with a medium body size, BMR per 1 kg of body weight in men is 1 kcal / h on average, for women - 0.9 kcal/h.

STANDARD PHYSIOLOGICAL REQUIREMENTS FOR ENERGY AND STANDARD NUTRITIONAL REQUIREMENTS: an average amount of food and biologically active substances required to ensure optimal physiological and biochemical processes, registered in the human genotype.

RATIONAL NUTRITION is a physiologically balanced diet of healthy people adjusted to their sex, age, occupation and other factors. A rational diet ensures normal growth and development, promotes high efficiency and productivity, increases life expectancy and resistance to various unfavorable factors.

'ADJUSTABLE' ENERGY CONSUMPTION means energy consumption caused by mental and physical activity.

A **BALANCED DIET** is a balance of individual nutrients (proteins, fats, carbohydrates, vitamins. etc.), when each of them can optimally perform their functions.

SPECIFIC DYNAMIC ACTION OF FOOD (FOOD THERMOGENESIS) means consumption of energy to metabolize nutrients in the body. If a diet is mixed, the SDDP is 10% (women) - 15% (male) of the value of basal metabolism.

ENERGY BALANCE is the equilibrium between the energy obtained with food and energy consumption to carry out all types of physical activity, to maintain basal metabolism, growth, development; as well as additional energy expenditure in women during pregnancy and breastfeeding.

DAILY ENERGY CONSUMPTION is the total daily energy expenditure of the body, consisting of general metabolism, energy expenditure on physical activity, specific dynamic action of food (food thermogenesis), growth and development of tissues in children and additional consumption in pregnant and lactating women.

The standard document:

"Standard physiological requirements for energy and nutrients for different groups in the Russian Federation" Guidelines. MR 2.3.1.2432-08.

These standards are the scientific basis for:

- planning of production of basic food commodities and food products in the Russian Federation;
- developing perspective average standards for consumption of basic food products taking into account changes in the socio-economic situation and the demographic composition of the population of the Russian Federation. Their aim is to support an optimal development of domestic agriculture and food security;
- planning food service in organized groups, and health care centers;
- working out nutrition recommendations for various groups and social protection measures;
- justifying the ingredients of specialized and fortified foods;
- assessing the actual diet of the individual and the population when used as criteria;
- developing programs for training specialists and educating the population about the principles of healthy nutrition.

Gender groups of adults:

Men and women aged 18-29, 30-39, 40-59, over 60

Classification of the population according to the physiological nutritional and energy requirements of the human body

Nutritional needs of individuals are varied. When planning dietary patterns, one should consider that the diet should be adequate to meet the nutritional and energy needs of an individual. There is a certain regulation in the Russian Federation that is designed for the maintenance of adequate nutrition of different professional groups. This regulation is known as "Standard physiological requirements for nutrients and energy intake for different groups of the population". According to this regulation, all working people are divided into the following groups:

I group. Workers engaged in mental activity (research workers, students, computer operators, teachers, traffic controllers, etc.).

II group. Workers engaged in low energy-consuming activity (tram and trolley-bus drivers, conveyor operators, postal or telecommunications workers, nurses, salespeople of manufactured goods, etc.).

III group. Workers engaged in more energy-consuming activity (metal workers, adjusters, machine operators, drilling technicians, textile workers, rail-workers, bus drivers, salespeople of foodstuffs, surgeons, etc.).

IV group. Workers engaged in high energy-consuming activity (builders, drifters, farmers, steelworkers, etc.).

V group. People engaged in highest energy-consuming physical activity (miners, navies, dockers, etc.).

When planning the dietary pattern for different groups of the population, the following principles should be considered:

- Sex (male, female);

- Age (Adult workers are subdivided into the following age groups: 18-29, 30-39, 40-59);
- Professional group;

Table 1

Hourly energy consumption (per 1 kg)

Activity	Energy consumed
Sleeping	0.9 kcal
Dressing & washing	2 kcal
Having a meal	1.4 kcal
Doing morning exercises	4 kcal
Walking to work	4 kcal
Making notes of lectures (sitting)	1.5 kcal
Having practical classes in a laboratory room (standing)	2.4 kcal
Studying	1.4 kcal
Reading (leaning against the desk)	1.3 kcal
Reading aloud (sitting)	1.5 kcal
Slow walking	2.7 kcal
Sewing & knitting	1.4 kcal
Washing dishes	1.4 kcal
Ironing	1.9 kcal
Laundering, sweeping the floor	3.4 kcal
Standing	1.6 kcal
Cleaning the shoes	2.4 kcal
Cleaning the carpet	3-4.8 kcal
Playing musical instruments	2.2 kcal
Driving a car	2.4 kcal
Driving a bicycle	9.0 kcal
Playing volleyball	3.0 kcal
Playing tennis	6.1 kcal
Playing football	8.5 kcal
Running at a speed of 8km/h	8.1 kcal
Swimming	7.1 kcal
Skating	10.0 kcal

Classification of nutrition-related diseases

1. Food borne diseases associated with infectious agents and parasites:

Anthrax, Brucellosis, tuberculosis, typhoid and paratyphoid fever, shigellosis and other bacterial intestinal infections;

Amebiasis, toxoplasmosis, giardiasis, foot and mouth disease, trichinosis, cysticercosis, bothriocephaliasis etc.

2. Food poisoning of microbial and non-microbial etiology.

3. Diseases caused by irrational, unbalanced diets.

- 3.1. Malnutrition, and lack of proper food: Protein and energy insufficiency. kwashiorkor; marasmus, avitaminosis, anemia.
- 3.2. Disease from excess feeding: obesity, hypertension.
- 3.3. Diseases caused by irrational, unbalanced diets: violation of nutritional status; overweight; hyperlipidemia, dyslipoproteinemia, hyperglycemia; hypovitaminosis, macro- and microelementosis; atherosclerosis and vascular disease, ischemic heart disease; diabetes mellitus, thyroid disease, diseases of the gastro-intestinal tract, gall stones, impaired bone structure and density; cancer; secondary immunodeficiency, tooth decay, gout.
4. Food allergy and intolerance.
5. Congenital metabolic disorders.

Table 2

Criteria for calculating probable risk from insufficient intake of food substances

Food substances	Level of probable risk					
	No risk	Low	Medium			High
		2%	16%	50%	84%	98%
Proteins, g/kg of body weight, per day for men & women over the age of 18	0.75-1.0 and higher (but not over 1.6)	0.75	0.675	0.60	0.525	0.45
Vit B ₁ , mg/day Men over 18 yrs Women over 18 yrs	1.2-1.5	1.2	1.1	1.0	0.9	0.8
	1.1-1.5	1.1	1.0	0.9	0.8	0.7
Vit B ₂ , mg/day Men over 18 yrs Women over 18 yrs	1.3-1.8	1.3	1.2	1.1	1.0	0.9
	1.1-1.8	1.1	1.0	0.9	0.8	0.7
Vit C, mg/day Men and women over 18 yrs	40-90	40.0	32.5	25.0	17.5	10.0
Vit A, Mkg eq/day Men over 18 yrs Women over 18 yrs	-	900.0	762.5	625.0	487.5	350.0
		700.0	600.0	500.0	400.0	300.0
Calcium, mg/day Men & women over 18 yrs	700-1000	700.0	612.5	525.0	462.5	450.0
Iron, mg/day Men over 18 yrs Women 18-49 yrs	8.7-10	8.7	7.7	6.7	5.7	4.7
	14.8-18	14.8	13.1	11.4	9.7	8.0

Women over 50	-	8.7	7.7	6.7	5.7	4.7
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Table 3

Factors preventing vs. factors promoting excessive body weight and obesity (WHO)

Risk reducing factors	Risk increasing factors
<i>Proven</i>	
Regular physical activity.	Sedentary lifestyle
High content of dietary fiber in the diet	Regular consumption of energy-dense foods (including fast food)
<i>Highly Probable</i>	
Optimization of feeding habits in children	Regular consumption of sweet soft drinks and juices
Breastfeeding	
<i>Probable</i>	
Low glycemic index foods *	Habit of using large meals
	Constant use of public catering system
<i>Presumptive</i>	
Limited intake of alcohol and in manageable fractions.	Alcohol abuse

* The glycemic index is the value showing the difference in the concentration of glucose in the blood serum within 2 hours after the consumption of a product compared to the same result after the consumption of the test product (50 g glucose).

Table 4

Factors preventing vs. factors promoting diabetes mellitus (WHO)

Risk reducing factors	Risk increasing factors
<i>Proven</i>	
Regular physical activity.	Sedentary lifestyle
Weight loss in overweight people	Being overweight and obese
	Deposition of fat in the abdominal area
<i>Highly Probable</i>	
A high content of dietary fiber in the diet	Consumption of saturated fatty acids
	Hypotrophy at birth
<i>Probable</i>	
Sufficient content of Omega-3 fatty acids in the diet	High content of "bad" fat in the diet
Low food glycemic index	Trans-fatty acids
Breastfeeding	
<i>Presumptive</i>	

Vitamin E, chromium, magnesium	Alcohol abuse
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Table 5

Factors preventing vs. factors promoting diseases of the cardiovascular system (WHO)

Risk reducing factors	Risk increasing factors
<i>Proven</i>	
Regular physical activity	saturated fatty acids
Polyunsaturated fatty acids (linoleic and omega-3 branched-chain)	Being overweight and obese
Fruits, berries, vegetables	Sodium
Potassium	Alcohol abuse
<i>Highly probable</i>	
Polyunsaturated fatty acids (linoleic)	Dietary cholesterol
Monounsaturated fatty acids (oleic)	Unfiltered coffee
Wholegrain	
Nuts (unsalted)	
Plant sterol, folate	
<i>Probable</i>	
Bioflavonoids	high content of lauric acid in the edible fat
Soy products	Hypotrophy at birth
<i>Presumptive</i>	
Calcium, magnesium, ascorbic acid	Carbohydrates, iron (added inorganic)

Table 6

Factors preventing vs. factors promoting oncological diseases (WHO)

Risk reducing factors	Risk increasing factors
<i>Proven</i>	
Regular physical activity (cancer of the large intestine)	Being overweight and obese (cancer of the esophagus, colon, breast in postmenopausal endometrium, kidney, prostate)
	Alcohol abuse (cancer of the oral cavity, pharynx, larynx, esophagus, liver, breast)
	Aflatoxin (liver)
<i>Highly probable</i>	
Regular physical activity (breast cancer)	Meat stored for long periods of time (cancer of the large intestine)

Fruits and vegetables (cancer of the oral cavity, esophagus, stomach, large intestine)	Salty foods (stomach cancer)
	Very hot drinks and products (cancer of the oral cavity, pharynx, esophagus)
<i>Probable (cancer at various sites)</i>	
Dietary fiber	Animal fats
Soy products	Nitrosamines
Vitamins B2. B6. B12. folate. C. D. E	Polycyclic aromatic hydrocarbons
Calcium, zinc, selenium, lignans, indoles, carotenoids	Polychlorinated biphenyls
Bioflavonoids, isoflavones, lignans, indoles, carotenoids	

Table 7

Factors preventing vs. factors promoting osteoporosis in the elderly (WHO)

Risk reducing factors	Risk increasing factors
<i>Proven</i>	
Regular physical activity	Hormonal dysfunction
Calcium	Alcohol abuse
Vitamin D	Low body weight
Optimal insolation	
<i>Highly probable</i>	
Fruits and vegetables	Excessive consumption of salt
Soy products	Over-consumption of proteins

Appendix

Table 1

Standard physiological requirements for proteins, fats, carbohydrates and energy

Group	Age	Energy	Protein	Animal protein	Fat	Carbohydrate
Male						
1	18-29	2450	72	40	81	358
	30-39	2000	68	37	77	335
	40-59	2100	65	36	70	303
2	18-29	2800	80	44	93	411
	30-39	2650	77	42	88	387
	40-59	2500	72	40	83	366
3	18-29	3300	94	52	110	484

	30-39	3150	89	49	105	462
	40-59	2950	84	46	98	432
4	18-29	3850	108	59	128	566
	30-39	3600	102	56	120	528
	40-59	3400	96	53	113	498
5	18-29	4200	117	64	154	586
	30-39	3950	111	61	144	550
	40-59	3750	104	57	137	524
Female						
1	18-29	2000	61	34	67	289
	30-39	1950	59	33	63	274
	40-59	1800	53	32	60	257
2	18-29	2200	66	36	73	318
	30-39	2150	65	36	72	311
	40-59	2100	63	35	70	305
3	18-29	2600	76	42	87	378
	30-39	2550	74	41	85	372
	40-59	2500	72	40	83	366
4	18-29	3050	87	48	102	462
	30-39	2950	84	48	98	432
	40-59	2850	82	45	95	417

Table 2

Menu plan (per serving) (g)

Foods	Weight (g)	Protein (g)	Fat(g)	Carbo-hydrate (g)	Energy value Ccal
Meat broth with noodle	500	3.5	0.39	24.48	111
Russian cabbage soup with meat broth	500	4.15	6.2	19.4	150
Meat cutlets fried in vegetable oil	110	18.2	15.83	13.79	270
Meat lean cutlets steamed	100	17.34	5.75	7.78	152
Beef cooked lean	50	18.6	17.25	8.43	263
Boiled chicken	85	10.4	4.4	0.3	82
Boiled fish	110	13.1	0.45	-	56
fried fish	110	13.6	10.4	3.7	163
Egg	48	6.09	5.52	0.33	75
Omelette (2 eggs)	110	8.05	3.57	3.13	76
Cottage cheese	130	17.26	13	11.92	233

with sour cream					
Milk	180	5.04	5.76	7.3	101
Kefir	180	5.04	5.76	7.3	101
Cheese	30	8.04	8.19	-	105
Porridge semolina	250	7.35	7.6	39.05	254
Boiled rice	200	6.33	7.62	48.38	287
Boiled buckwheat	180	12.6	7.32	49.2	313
Boiled vermicelli	185	6.45	4.9	44.56	243
Boiled millet with pumpkin	270	9.68	8.77	50	317
Stewed beet	160	3.82	12.02	23.03	215
Boiled potato with vegetable oil	210	4.82	4.32	40	215
Mashed potato	240	4.8	6.15	40.81	237
Stewed cabbage	200	4.25	10	13.64	161
Stewed vegetables	250	5.41	7.25	30	206
Salad with sauerkraut	110	1	10	3	105
Salad with boiled cooked vegetables and vegetable oil	220	4	10	21.19	191
Stewed fruits	200	0.17	-	24	100
Stewed dried fruits	200	0.1	-	40	200
Apple juice	100	0.5	-	12	48
Tea with sugar	200	0.05	-	15	56
Coffee with sugar and milk	200	3.21	3.63	20	110

Table 3

Physiological daily requirement in vitamins

Group	Age	C Mg	A mic	E mg	D mic	B1 mg	B2 mg	B6 mg
1	2	3	4	5	6	7	8	9
Male								
I	18-59	70.0	1000.0	10.0	2.5	1.2	1.5	2.0
II	18-59	70.0	1000.0	10.0	2.5	1.4	1.7	2.0
III	18-59	80.0	1000.0	10.0	2.5	1.6	2.0	2.0
IV	18-59	80.0	1000.0	10.0	2.5	1.9	2.2	2.0
V	18-59	100.0	1000.0	10.0	2.5	2.4	2.4	2.0
Male over 59								
60-74		80.0	1000.0	15.0	2.5	1.4	1.6	2.2
Over 75		80.0	1000.0	15.5	2.5	1.2	1.4	2.2

Female								
I	18-59	70.0	800.0	8.0	2.5	1.1	1.3	1.8
II	18-59	70.0	800.0	8.0	2.5	1.1	1.3	1.8
III	18-59	80.0	1000.0	8.0	2.5	1.3	1.5	1.8
IV	18-59	80.0	1000.0	8.0	2.5	1.5	1.8	1.8
Female over 59								
60-74		80.0	800.0	12.0	2.5	1.3	1.5	2.0
Over 75		80.0	800.0	12.0	2.5	1.1	1.3	2.0
In addition to standard (pregnancy)								
		+20.0	+200.0	+2.0	+10.0	+0.4	+0.3	+0.3
1	2	3	4	5	6	7	8	9
Infant								
0-3		30.0	400.0	3.0	10.0	0.3	0.4	0.4
4-6		35.0	400.0	3.0	10.0	0.4	0.5	0.58
7-12		40.0	400.0	4.0	10.0	0.5	0.6	0.6
1-3 year		45.0	450.0	5.0	10.0	0.8	0.9	0.9
Children								
4-5 year		50.0	500.0	7.0	2.5	0.9	1.0	1.3
Pupil								
6 year old		60.0	500.0	10.0	2.5	1.0	1.2	1.3
7-10		60.0	700.0	10.0	2.5	1.2	1.4	1.6
11-13 male		70.0	1000.0	12.0	2.5	1.4	1.7	1.8
11-13 female		70.0	800.0	10.0	2.5	1.3	1.5	1.6
14-17 male		70.0	1000.0	15.0	2.5	1.5	1.8	2.0
14-17 female		70.0	800.0	12.0	2.5	1.3	1.5	1.6

Table 4

Physiological daily requirement in minerals (mg)

Minerals	Male	Female	In addition to standard		
			Pregnant	Breast-feeding (1-6)	Breast-feeding (7-12)
Calcium	1000	1000	300	400	400
Phosphorus	800	800	200	200	200
Magnesium	400	400	50	50	50
Potassium	2500	2500	-	-	-
Sodium	1300	1300	-	-	--
Chlorine	2300	2300	-	-	-
Iron	10	180	15	0	0
Zinc	12	12	3	3	3
Iodine	150	150	70	140	140

