Course: Pediatric Dietetics

Field of study: Dietetics

Type of instruction and number of hours: lecture 30 h, practical classes 30 h

Number of ECTS credits: 5

Learning outcomes:

Knowledge:

- Student knows the general rules of nutrition for women in the preconception period and during pregnancy. Student can explain the necessity of changes in the nutrition of a pregnant woman and their impact on the development of the foetus. Student can define and discuss the periods of human development, taking into account the development of the digestive system;
- Student knows the rules of natural and artificial feeding of an infant and is able to explain the impact of inappropriate nutrition practices on the development of diseases;
- Student can explain the relationship between changes in diet and changes in nutrition recommendations for children in different stages of disease;
- Student knows the importance and mechanism of action of probiotics and prebiotic supplementation as well as vitamins, macro and micronutrients of food. He or she can discuss their relationship with the development of the child's immune system.

Skills:

- Student can prepare a weekly menu for healthy infants, taking into account IMC recommendations and estimate the necessary nutritional requirements as well as vitamins, micro and macro elements, choosing the right products to calculate daily nutrition recommendations.
- Student can prepare a weekly menu for ill infants, taking into account the IMC recommendations and estimate the necessary nutritional requirements as well as vitamins, micro and macro elements, searching for appropriate products to calculate daily nutrition recommendations, taking into account contraindicated products in selected disease entities.
- Student is able to prepare a weekly menu for a pregnant woman and the preconception period and estimate the need for essential nutrients as well as vitamins, micro and macro elements, find the right products to calculate and prepare daily nutrition recommendations.
- Student can analyse menu and nutrition of women as well as determine the causes of deficiencies in the diet of infants, women in the preconception period, pregnant and breastfeeding mothers. Student can assess such deficiencies and by using available computer programs, he or she can plan their nutrition.

Social competences:

- Student is aware of his or her knowledge in the field of nutrition of infants, pregnant and lactating women and the need broaden his or her knowledge on a regular basis;
- Student shows creativity in solving tasks and creating projects, is open-minded and works in a team to solve problems.

Evaluation methods of learning outcomes:

written test, activity during classes – solving tasks

Subject matter of the classes:

Lecture:

1. Stages of human development. Functional development of the digestive tract.
2. Nutrition in the prenatal period. Perinatal nutrition. The influence of nutrition on the development of children's immune system. General assumptions of nutrition in pediatrics.
3. Nutrition in pediatrics – recommendations for healthy children.
4. Nutrition of children and civilisation diseases.
5. Problems accompanying enteral/ parenteral nutrition in children.
6. Nutrition of children in phenylketonuria (PKU), kidney diseases, diseases of the liver and pancreas, various disease states, food allergies, gluten-dependent celiac diseases, functional disorders of the digestive tract – diarrhea.
7. Nutrition for children with special needs, the role of nutrition in preventing developmental problems like low birth weight (LBW), preterm birth, birth defects, fetal alcohol syndrome.
8. Prevention of vitamin D3 deficiency in children, pregnant and lactating women – recommendations.
9. Nutrition standards for children, pregnant and lactating women.
10. Prebiotics and probiotics in the nutrition of children.

Laboratory classes:

1. Stages of human development and principles of nutrition.
2. Nutrition assumptions of a pregnant woman and a woman planning pregnancy.
3. Nutrition of children in the first years of life.
4. Prebiotics and probiotics in the diet, importance for children's health.
5. Nutrition principles in food allergy.
6. Nutrition of children with kidney diseases, liver and pancreatic diseases.
7. Rules of supplementation and prevention of vitamin D3 deficiency.
8. Methods of assessing the development of children. Normal growth in children – average weight, height and head circumference in children.
9. Nutrition of children and civilisation diseases/chronic non-communicable diseases – NCDs.

Bibliography

Basic literature

Coulston A., Boushey C., Ferruzzi M., Delahanty L., *Nutrition in the Prevention and Treatment of Disease*, Elsevier - Academic Press, 2017.

Jarosz M., Rychlik E., Stoś K., Charzewska J., *Normy żywienia dla populacji Polski i ich zastosowanie*, PZH, 2020.

Koletzko B., Bhatia J., Bhutta Z. A., Cooper P., Makrides M., Uauy R., Wang W., *Pediatric Nutrition in Practice*, Karger, 2015.

Konek S., Becker P., *Pediatric nutrition in clinical care*, Jones & Bartlett Learning, 2020.

Kułaga Z., Różdżyńska-Świątkowska A., Grajda A., Gurzkowska B., Wojtyło M., Góźdź M., Świąder-Leśniak A., Litwin M., *Siatki centylowe dla oceny wzrastania i stanu odżywienia polskich dzieci i młodzieży od urodzenia do 18 roku życia*. Standardy Medyczne/Pediatria 2015(12):119-135.

Complementary literature

Gorbacz-Gancarz B., Ostrowska L., Stefańska E., Supińska E., Szczepaniak E*., English for Dietetics*, PZWL, 2016.

Hark L., Deen D., Morrison G., *Medical nutrition & disease. A case-based approach*, Wiley Blackwell, 2014.

Madhu S., *Pediatric nutrition in health and disease*, Jaypee, 2013.

Websites

World Health Organization: https://www.who.int/health-topics/#D

Maternal Nutrition in Pregnancy and Lactation

Maternal nutrition not only influences the health and well-being of the mother but also has intermediate and long-term effects on the development and health of the infant. Growth is a sensitive marker of health and nutritional status at the development stage. Growth monitoring is important both for children with diseases and for healthy children. Early growth is associated with long-term development, health and well-being.

Some nutrients are considered to be beneficial for the pregnancy state, for example:

- **Omega 3 fatty acids** help in prevention of premature delivery and low birth weight;
- **Folic acid** supplement for regular growth of the follicles;
- **Magnesium and zinc** supplements for the binding of hormones receptor sites.
- **Vitamin B_{12}** reduces chances of infertility and ill health;
- **Vitamin D** supplement has important role in reducing the incidence of rickets with pelvic malformations which can hamper normal delivery.

Breastfed infants grow slower during infancy, which is likely to have beneficial long-term effects. Poor diet may contribute to dietary deficiencies. There is a relationship between diet and pregnancy complications.

Liver and kidney defects may develop when the mother-to-be has nutritional deficiencies. There is a link between excessive birth weight and the increased need for caesarean section.

Medical Nutrition Therapy in disease

Diarrheal illnesses in children follow a continuum from acute to chronic or persistent diarrhea. Acute diarrhea can be a common side effect of gastroenteritis, infectious diseases, foodborne illness, and chronic gastrointestinal diseases like Crohn's Disease and irritable bowel syndrome.

Diarrhea defined by WHO (World Health Organization) – passage of three or more loose, watery stools per day or as 10 mL/kg liquid stool per day.
Celiac Disease (CD) is an immune mediated disease affected by both genetics and the environment. Most cases of CD will be diagnosed within the first 5 years of T1D diagnosis and therefore, screening should be repeated every 2-5 years after initial testing. If a positive result for anti-tTG is confirmed, the patient should immediately start a gluten-free diet. It is a multisystem, T-cell-mediated chronic autoimmune intestinal disorder that occurs in genetically predisposed individuals carrying human leukocyte antigen (HLA)-DQ2 and/or DQ8 haplotypes. Additional at-risk populations include those previously diagnosed with type 1 diabetes mellitus, autoimmune thyroid disease, selective IgA deficiency, Trisomy 21, Turner Syndrome, and Williams Syndrome.

1. Case study – prepare one day menu for pregnant woman in the third trimester

Pregnant women have higher energy needs, depending on their body mass, age and how physically active they are. However, a woman's daily intake should increase in the second trimester of pregnancy by 285 kcal and in the third trimester by 475 kcal daily, and by 505 kcal for breastfeeding women. Severe weight gain during pregnancy may lead to obesity in later life. Obesity in pregnancy increases the risk of diabetes, hypertension, preeclampsia and urinary infections. Big Baby Syndrome may also occur. On the other hand, low calorie intake during pregnancy is likely to cause malnutrition of the mother and a low birth weight of the fetus.

Weight: 85 kg (187,4 lb)
Height: 170 cm (5,57 ft)
Age: 27 years
Physical activity level: 1,4

2. Study the following case and answer the question that follow

Monica Maller is 14-year female who was diagnosed with celiac disease two months ago. This is her first visit to the celiac clinic post-diagnosis. Recent lab values reflect vitamin D of 28,1 ng/ml. DEXA revealed z-score of -0,8. Monica has started eliminating gluten from her diet. Weight at today's visit is 35,1 kg, height is 151,5 cm.

Her 24 Hour Diet consisted of:

Breakfast: oatmeal mixed 40 g with 1 cup of skim milk 300 ml, banana 300 g
Lunch: turkey and cheese on gluten-free bread, cucumber 50 g, water 250 ml
Snack: popcorn 100 g with tomato sauce 50 g
Dinner: chicken 150 g, black rice 80 g, green peas 100 g, apple juice 250 ml
Snack: gluten-free pretzels 100 g
Snack: gluten-free cookies 200 g

Estimated needs:
Calories (per day):
Protein (grammes per kg):
Fluid (ml per day):

Calculate the following:

Wt/age percentile:	IBW (kg):
Ht/age percentile:	% IBW:
Stnd. Ht/age (cm):	BMI:
% Stnd Ht/age:	BMI percentile:

Classify Monica's nutritional status (choose only one of them):
- Wasted (mild/moderate/severe)
- Normal
- Stunted (mild/moderate/severe)

Answer the questions:

1. Comment on DEXA results and vitamin D level.
2. Can you identify any sources of gluten that Monica is currently receiving in her diet?
3. What would you recommend to Monica? Any vitamin or mineral supplementation? If any, please specify.
4. What kind of goals would you suggest for Monica?

3. Study the following case and answer the question below

Patrick Nickson was found by a cleaning lady when he was sleeping on the stairs in an underground car park. Patrick told the cleaning lady that he had run away from home about two months ago. He was sleeping in abandoned houses and looking for food in restaurants. The 14-year-old boy has been immediately taken by social services. They found out that his mother had been working abroad and he had been physically and mentally abused by his stepfather. Next, Patrick was thoroughly examined by a general practitioner, who described him as skinny, with spindly in shape arms and legs, slumped posture, dull, red eyes, sallow and mottled complexion, whole body – numerous bruises, sores and scars. The doctor referred Patrick to hospital for further examination. In hospital, his first meal was a dinner. The hospital staff asked a dietician if Patrick could get a three-course lunch consisting of a bowl of onion soup with potatoes and soft-cream 150 ml, pork chop 100 g, cauliflower 100 g, and cucumber 20 g and strawberry yoghurt 200 ml.

1. What kind of changes may occur when a well-balanced, nutritious diet is introduced?
2. What do you think about the meal taking into consideration that the patient is lacking many nutrients and has been starving for many days. Should patient eat all of this?
3. What is the right size of food portion for him?
4. What kind of tools can you prepare for this patient to visualise accurate portion sizes?
5. What should be introduced first into the patient's diet?
6. Can you tell anything about nutritional status this boy?
7. What should be measured to check patient's nutritional status?
8. How often should the patient eat?
9. Can you rate the BMI? Why/ Why not?

4. Write a three-day menu for Patrick or for the person from your partner's case

5. Think about your own case study

Write the most important information about your patient, like height, weight, age, sex and physical activity. Remember about 24-hour dietary recall. Describe the main problem of this patient. Swap your case with another student and discuss.

6. In pairs prepare a set of information concerning the patient from the list below (personal data, medical records, medical history). Then, present a case report of your patient in the group session

1. A diabetic child patient.
2. A pregnant woman with anemia.
3. A pregnant woman with gestational diabetes.
4. An overweight child.
5. A young woman with malnutrition.
6. A child with cow-milk intolerance.
7. A child with phenylketonuria (PKU).

7. Prepare a brochure for the patient

Choose a disease from task 6 list. Search the Science Web for additional information on the disorder and its dietary treatment. Include the following points: disease definition, symptoms and dietary treatment – foods to eat and foods to avoid (including reasons).

8. Taking a Feeding History for older children. Use the following in dialogue with your partner information from the list below

For older children:

- How do the parents describe their child's appetite?
- What does your child eat at each meal and as a snack (obtain 1- or 2-day sample meal pattern)?
- How many meals and snacks are eaten each day?
- Where does the child eat meals?
- Are there family mealtimes?
- Are these happy and enjoyable situations?
- How much milk does the child drink?
- How much juice does the child drink?
- How often are snacks/snack foods eaten?

9. Choose the correct answer

A. Pregnant women have a higher energy needs, depending on their:

a. Age.
b. Body mass.
c. Physical activity.
d. All of them.

B. Mother's diet has a great impact during pregnancy and breastfeeding on health of:

a. Child.
b. Mother.
c. Both the mother and child.
d. None of them.

C. What sources should the pediatric dietetic use to find data for the assessment of nutritional status? Circle all the applicable answers.

a. Electronic medical record.
b. PubMed and google scholar.
c. Physical assessment.
d. Patent interview.
e. Diet history – 24-hour recall.

D. Measurement of _____ may help to determine whether a low serum protein level is caused by stress or nutritional deficiency.

a. C-reactive protein.
b. Interleukin 10.
c. Transferrin.
d. Albumin.

E. The optimal method of calculating energy needs for a child is:
a. Nutrition focused physical examination.
b. Indirect calorimetry measurement.
c. Schofield equation.
d. Harris-Benedict equation.

F. The only known treatment for celiac disease is following to a gluten-free diet. Which of the following foods listed below may contain gluten?
a. Baked Beans.
b. Hot milk.
c. Baked potatoes.
d. Onion Soup.
e. All of the above.

G. The specific nutrition diagnosis determined on the basis of the nutrition assessment aids in the specification of the appropriate medical nutrition therapy intervention. Which one of the following is not recommended as a first line of therapy in children with constipation?
a. Increased fluid intake.
b. Increased physical activity.
c. High Fibre Diet.
d. Use of probiotics and prebiotics.

10. Think about this questions and answer them in pairs. Write the answers on the paper

1. What can growth assessment be used for?
2. At what age is stature measured?
3. What growth charts are the most appropriate for US children under 2 years of age, and why?
4. What growth charts are the most appropriate for Polish children under 5 years of age, and why?
5. What growth charts are the most appropriate for children in your country, and why?
6. What are the most important factors used for determining overweight/ obesity status in children?
7. What physical changes occur over the puberty period?
8. Why is the assessment of head circumference important in early childhood?

11. Analyse the list of the patient's food and give dietary recommendations for child with phenylketonuria (PKU)

Menu – day 1:
1. Reduced-fat milk (2%) 200 ml, 4 wholegrain toasts with butter and chicken ham 100 g,
2. banana, plain yoghurt 200 ml,
3. Home-made: boiled potatoes 200 g, beef steak 50 g, green salad 50 g,
4. Coke 200 ml,
5. Home-made red beetroot and feta salad 150 g, 2 slices of whole grain bread,
6. Grapes 150 g, one chocolate bar 100 g.

Menu – day 2:

1. A bowl of cereal 40 g with milk 250 ml, 1 toast with butter and jam, apple juice 200 ml,
2. French fries 150 g,
3. Crisps 100 g,
4. A glass of chocolate milk 250 ml,
5. 2 chocolate bars 25 g each, a packet of butter biscuits 100 g,
6. 1 sausage 25 g, ketchup 30 g, 2 slices of white bread with margarine.

Menu – day 3:

1. 2 boiled eggs, 2 slices of wholegrain bread with butter, green salad with organic olive oil, tea 200 ml,
2. 1 apple, plain yoghurt 150 ml,
3. Home-made spaghetti with pork 200 g,
4. 1 grated carrot and 1 grated apple,
5. Walnuts and almonds mix 25 g,
6. 2 slices of wholegrain bread, steamed broccoli 100 g, 250 ml of mineral water.

12. Prepare an oral and visual presentation in power point. Choose a disease from list below. Search the Science Web for additional information on the disorder and its dietary treatment. Include the following points: disease definition, symptoms and dietary treatment – foods to eat and foods to avoid (including reasons)

1. A pregnat woman.
2. An overweight child.
3. A child with cow-milk intolerance.
4. A child with phenylketonuria (PKU).
5. A diabetic child patient.
6. A young woman with malnutrition.

13. Complete the dialogue – an interview with a registered nutritionist. Use the words below, then, check if your predictions have been correct. Read text in pairs with division into roles of journalist and dietetic Lucilda Mayers

Global, food, home-cooked, meal, sweets, micronutrients

Broadcaster: *Good morning to our daily programme 'Hello, Sunshine!'. Today we have Lucilda Mayers with us, the expert in nutrition and dietary assessment, as well as the expert on feeding child.*

Lucilda: Hello everyone.

Broadcaster: *Lucilda, what is the major problem with kids and their diet?*

Lucilda: Nowadays, children, adolescents in particular, consume too much junk food.

Broadcaster: *Fast food is a ..... and growing problem in this days.*

Lucilda: Exactly! It is. It is extremely hard to convince the teenagers to eat healthy, to eat nourishing meal.

Broadcaster: *Meals which are healthy and make you strong.*

Lucilda: Of course, fresh-made products are good for them.
Broadcaster: Foods grown on farms, like dairy and other agricultural products.
Lucilda: Exactly, fresh and organic ..... in particular.
Broadcaster: But many people complain that this food is expensive and perishable food.
Lucilda: It is better to spend money on good quality than on long-term health treatments. Processed foods, for example, are likely to cause many preventable diseases and allergies. Ready meals should be substituted for ..... meals. Most importantly, food additives, which are unbelievably bad for our long-term health, have to be completely eliminated from kid's diet. Unfortunately, children love high-calorie products because the substances they contain improve their taste and make them look good. What is more, crisps, ... or fizzy drinks spoil your appetite.
Broadcaster: What can you tell about children with diabetes?
Lucilda: A child with diabetes requires a well-balanced diet with adequate intake of all macronutrients, ... and vitamins. Working with a child who is a picky eater can pose many challenges. Questions to ask may include: What are the eating and mealtime behaviours of the child? Do they tend to over or under eat, refuse to try new foods, or eat meals within a reasonable time frame? These are all topics that need to be discussed when assessing dietary intake. Also, a child may have food allergies or restrictions which are important when developing the ..... plan.
Broadcaster: Thank you very much Lucilda.
Lucilda: Thank you, bye.

14. Complete the sentences with the words from the list below

A child's growth pattern can be divided into four general periods. Childhood is the period during which a person is a child. It ends with puberty – the beginning of sexual maturity. Infant is another word for a young child.

These growth periods are:

- Infancy (from birth to … years of age)
- Pre-school years (from about … to … years of age)
- Middle childhood (from about … to … years of age)
- Adolescence (from about … to … years of age)

The milestones in a child's development and the ages at which they usually occur are:

- Walking – by … months
- First words – by … months
- Crawling – by … months
- Sitting – by … months
- Smiling – by … months

Lecturer:
Jagoda Rydelek-Pęk, Doctor of Health Sciences

e-mail address: jagoda.rydelek@pwsz.nysa.pl