Not thriving


A child who is failing to thrive

Failure to thrive (*FTT*) is a condition in which an individual does not achieve optimal weight gain, or even weight loss occurs. Other accompanying signs are insufficient head circumference and height of the child. [1] Weight is the most sensitive indicator for young children, height for older children. [2] There is no clear agreement on what can be considered the boundary between physiological and pathological values. **Growth below the 3rd percentile** or changes in the given parameter that exceed two percentile bands can be considered failure. Failure to thrive can signal a serious condition that can threaten the child's further development, both physically and psychologically. [3]

Failure to thrive can be of organic or inorganic origin (psychosomatic problem with multifactorial etiology). [3]

In terms of **differential diagnosis**, it is necessary to distinguish between children with a familial short stature and constitutional growth delay - in the first two years of life, the child reaches the percentile of its parents, therefore growth may slow down (birth length, weight, head circumference of a full-term newborn are rather a reflection of the intrauterine environment, while parameters at two years already correlate with parents' height and reflect genetic influences). Especially in the period between 4 and 12 months of age, *the height/length parameter* decreases more in children with constitutional delay than in children with failure to thrive. [3]

Another special group is children with intrauterine growth retardation. [3]

Breastfed babies are often at the lower end of the growth charts without thriving, because the growth charts were created with the help of data obtained from formula-fed babies as well. Especially in the period between 6 and 18 months of age, the average weight of breastfed children is lower than that of formula-fed children. [3]

Failure to thrive during infancy and toddlerhood can have serious consequences, because during this period there is rapid growth, the immune system is immature and thus the risk of infections is increased, and cognitive and emotional development takes place during this period, the disruption of which can cause a reduction in intellectual, social and emotional abilities. [3]

Anthropometric parameters

Mass

During the first five months, the baby usually doubles its birth weight, and by the end of the first year of life, it will triple on average. Weight gains in the first year of life therefore gradually decrease. While they average 150-250g per week after birth, by the end of the first year they are only 50-80g per week. In the second year, the child gains about 2-3 kg per year, in the third year about 2 kg. For older infants and larger children, weight must always be assessed in relation to length (height), i.e. the so-called weight-height ratio or BMI (*Body Mass Index*). BMI increases in the first year of life, gradually decreases from the second to the fifth year, then increases again.

Body weight is less dependent on innate factors than height and it can be influenced to a large extent mainly by the way of eating and, in later periods, by the physical activity of the child.

Head circumference

Brain growth is fastest in the first two years of life. The fronto-occipital head circumference is measured with a tape measure at the level of the glabella and the greatest curvature of the back of the head.

Head circumference is a less sensitive indicator of nutritional status and is the last anthropometric parameter affected by malnutrition.

Length/height

An important parameter is the development of length/height, i.e. the growth curve. For children under two years of age, body length is measured using a body meter ("trough"), for older children, standing height is measured.

A child's growth is influenced by a number of genetic and external factors (race, nationality, gender, parents' height; diet, chronic diseases, physical activity).

Growth rate

Growth rate is defined as the number of centimeters a child grows over a period of time (usually height gain per year). During a child's development, periods of faster growth and periods of slow growth alternate. The fastest growth rate is in the first six months of life, it slows down significantly around the age of two. After the eleventh year, the puberty spurt occurs. [3]

Organic causes

Malabsorption syndrome

Malabsorption syndrome includes:

- disorders of digestion (insufficiency of external pancreatic secretion – cystic fibrosis, Shwachman-Diamond syndrome, chronic pancreatitis; resection of the stomach; disorder of metabolism and excretion of bile acids);
- absorption disorders (lactase deficiency, sucrase-isomaltase deficiency, celiac disease, idiopathic intestinal inflammation, gastrointestinal allergies, protracted infectious gastroenteritis, short bowel syndrome, ...);
- secretion disorders (exudative enteropathy);
- motility disorders (intestinal dysganglionosis, Hirschsprung's disease).

Endocrinopathy

- hypothyroidism – ↓ growth rate, ↑ weight gain; ↓ fT4, ↑ TSH;
- adrenal insufficiency – ↓ weight gain, vomiting, apathy; ↓ cortisol, ↑ ACTH, ↓ S-Na, ↑ SK;
- hypercortisolism – ↓ growth rate reduction, obesity; ↑ cortisol in urine/24 h;
- diabetes mellitus – weight failure, ↓ weight, polyuria, polydipsia; ↑ s-glucose, ↑ HBA1C, glycosuria;
- diabetes insipidus –↓ weight gain, polyuria, polydipsia, sub-/febrile; ↑ S-Na, ↑ S-osmolality, ↓ U-osmolality;
- disease of the parathyroid glands (hypoparathyroidism , hyperparathyroidism) – tetany, paresthesia, ↓ growth rate, ↓ weight gain; Ca, P, ALP, PTH;
- STH deficit – ↓ growth rate; delayed bone age, dynamic tests of STH secretion;
- hypopituitarism – ↓ growth rate, ↓ weight gain according to deficient hormones; delayed bone age, examination of the secretion of relevant hormones.

Failure to thrive on inadequate income

- iron deficiency (anemia and hyposideremia);
- feeding disorders (impaired appetite, food search, swallowing, swallowing disorders, sucking-swallowing-breathing coordination disorders, swallowing neuromuscular coordination, esophageal peristalsis disorder, mucosal infection and inflammation, combined feeding and swallowing disorders - xerostomia, hypothyroidism, hyperparathyroidism, trisomic syndromes (18, 21), Prader-Willi syndrome, allergies, disorders of lipid metabolism, neurofibromatosis, Williams syndrome , Coffin-Siris syndrome, Opitz-G syndrome, Cornelia de Lange syndrome, deletion syndromes, epidermolysis bullosa);
- inappropriate diet (vegetarianism – lack of iron, vitamin D);
- vomiting. [3]

Inorganic causes

Non-organic failure to thrive is caused by poor child care – it can be caused by psychological, social and emotional neglect of the child. They can be considered one of the types of passive physical abuse, which is part of the CAN (*Child Abuse and Neglect*) syndrome. [3]

Examination

Anamnesis

- general anamnestic data;
- data related to feeding method (breastfeeding/artificial feeding, frequency/duration of feeding, time of introduction/tolerance of solid food, who/where the child feeds, vomiting/stools);
- manifestations of oral-motor dysfunction (difficulty with sucking, chewing and swallowing, abnormally long feeding time, little appetite, delayed tolerance of solid food, difficult to distinguish signals of hunger and satiety, refusal of food);
- typical problems: vomiting, diarrhea, abdominal pain, breathing difficulties, chronic cough, fatigue, cyanosis, feeding difficulties, frequency of urination, excessive thirst;
- family history (somatic parameters, diseases, developmental problems, nutritional problems, allergies);
- psychosocial data (completeness of the family, employment, financial situation, psychiatric morbidity). [3][1]

Physical exam

- physical exam;
- assessment of growth parameters (weight, length/height, head circumference – every 1 week);
- assessment of somatic parameters associated with failure to thrive (small length/height for age, low weight for height, wide-set eyes, thin chest, hanging buttocks, skin folds in armpits, expressionless face, reduced vocalization, motor activity and response to social stimuli, can't behave, clenched fists, protruding belly).

Indications for examination by a nutritional specialist:

- weight loss greater than 5% (not related to dehydration);
- diagnosis associated with the development of protein-caloric malnutrition (organic causes of failure to thrive);
- weight/height ratio below 3rd percentile or below 90% of standard (standard = 50th percentile for age);
- serum albumin below 35 g/l (with the exception of the smallest infants under two months).

Laboratory examination

- urine: chemically, microscopically, by culture, osmolality (specific gravity),
- blood: FW, KO, CRP, creatinine, ions (Na, K, Cl, Ca, P), acid-base balance, glycemia, bilirubin, AST, ALT, GMT, ALP, TSH, fT4;
- feces: culture, parasitology, reducing agents, pH;
- imaging methods: abdominal ultrasonography, x-ray - bone age;
- Cl in sweat;
- tuberculin test;
- toxicology: Pb, event. next;
- HIV;
- metabolic examination for the event detection of hereditary metabolic disorders. [3]

Therapy

- organic failure - treatment of the primary disease.

Nutritional treatment

- sufficient caloric intake (infant formula with the addition of glucose polymers and fats (MCT oil, corn oil), possibly protein fortification);
- correction of nutritional deficits (Fe, Zn, multivitamin preparations with trace elements,...);
- achieving a growth spurt ("catch-up") - a 25-30% higher energy supply and double the amount of protein than usual is recommended;
- restoration of optimal body composition.

Parent education

- food should be pleasant, without pressure;
- positive motivation – praise, not punish;
- let the child eat alone, even if he makes a mess;
- a positive example – the whole family eats together, the child imitates siblings and parents;
- determine the period when the child does not receive food - for example, do not give food or drink (except water) an hour before the meal;
- offer solid food first, then drinks, limit juices;
- set a certain time limit for food, then do not serve more portions;
- learn to recognize when the child is full and when he is hungry;
- limit distractions while eating (television, reading). [3]

Links

Related articles

- Nutrition of children: Nutrition of the newborn • Breastfeeding • Artificial nutrition of the infant • Non-dairy diet of the infant • Recommendations for infant nutrition 2011 • Nutrition of older infants and young children • Nutrition of preschool, school children and youth
- Recommended nutrient intake (pediatrics) • Factors affecting nutritional needs
- Eating disorders

External links

- FRÜHAUF, Pavel, et al. *Neprospívání kojenců a batolat* [online] . 2004. edition. 2004. 56 pp. Available from <http://www.vfn.cz/pracoviste/kliniky-a-oddeleni/klinika-detskeho-a-dorostoveho-lekarstvi/>.
- SÝKORA, J – HUML, M. Syndrom neprospívajícího kojence. *Pediatr. prax* [online]. 2010, y. 11, vol. 5, p. - , Available from <http://www.solen.sk/index.php?page=pdf_view&pdf_id=4656>.

References

1. O'CALLAGHAN, Christopher – STEPHENSON, Terence. *Pediatrie do kapsy.* 2. edition. Praha : Grada, 2005. ISBN 8024709333.
2. TASKER, Robert C. – MCCLURE, Robert J. – ACERINI, Carlo L.. *Oxford Handbook of Paediatrics.* 1. edition. New

York : Oxford University Press, 2008. pp. 318-319. ISBN 978-0-19-856573-4.
3. FRÜHAUF, Pavel, et al. *Neprospívání kojenců a batolat* [online] . 1. edition. 2004. 56 pp. Available from <http://www.vfn.cz/pracoviste/kliniky-a-oddeleni/klinika-detskeho-a-dorostoveho-lekarstvi/>.