MEDICAL UNIVERSITY - PLEVEN
FACULTY OF MEDICINE

Department of Pediatrics

Lecture № 8

HYPOTROPHY. OBESITY IN CHILDREN

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UNDERNUTRITION

(HYPOTROPHY)

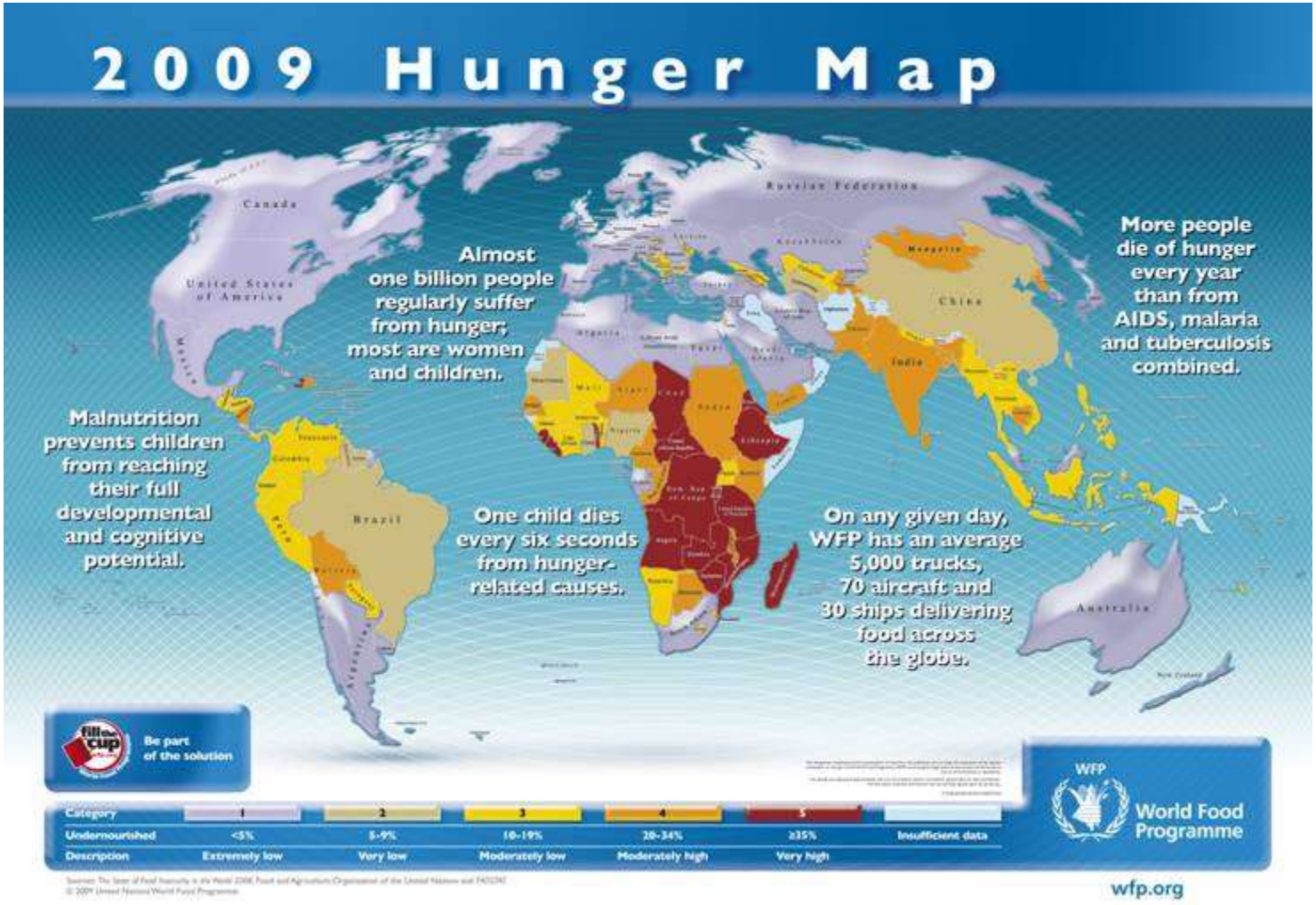
INTRODUCTION

- Malnutrition is very important healthy problem because of the growth
- Regular nutritional state assessment is recommended for early diagnosis of hypotrophy
- The incidence is about 1- 2 %
- Light forms (Hypotrophy)
- Severe forms (Marasmus)

CAUSES OF UNDERNUTRITION

- Inadequate food intake (Primary hypotrophy)
  - Inadequate food amount
  - Inadequate food quality
- Diseases that interfere with digestion and absorption (Secondary hypotrophy):
  - Chronic infections
  - Congenital anomalies (Pyloric stenosis, Gastroesophageal reflux, cardiac, renal and brain abnomalities)
  - Malabsorption (Cystic fibrosis, Celiac disease, Intolerance to milk proteins)
  - Chronic hemolytic anemia
  - Oncology
  - Congenital metabolic diseases
  - Social deprivation

CAUSES OF UNDERNUTRITION



CLINICAL SIGNS

- Loss of body weight
- Normal body height
- Loss of subcutaneous fat tissue

CLASSIFICATION:

1-st stage (Light form)

- Infant fails to gain weight
- Weight loss 10-20% of BW, the height is normal
- Loss of fat tissue in chest and abdomen
- General condition is not bad

CLASSIFICATION:

2-d stage (Moderate form)

- Infant fails to gain weight
- Weight loss 20-40% of BW
- The height is less than normal
- Loss of fat tissue in body and limbs
- Loose wrinkled skin with poor turgor
- Loss of appetite
- Irritability or apathy

CLASSIFICATION:

3-rd stage (Marasmus)

- Severe general condition
- Weight loss more than 40% of BW
- Growth arrest
- Loss of fat tissue in all body, limbs and face
- The abdomen is flat
- The muscles are atrophic
- The pulse is low

kwashiorkor

marasmus

- The temperature is subnormal
- Poor physical activity
- Constipation or diarrhea
- Common intercurrent infections

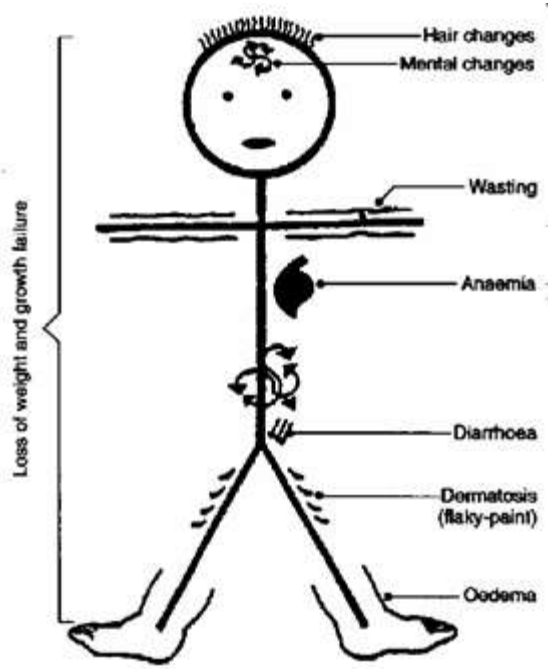
KWASHIORKOR ("SUGAR BABY")

- **Most common between 1-5 years o following weaning from the breast**
- **Causes:**
  - **A lack of protein in the diet (deficiency amino acids)**
  - **Energy malnutrition**
  - **Vitamin and mineral deficiency**
- **Prevalence in developing countries, using mainly carbohydrate food (rice, wheat cereals, corn)**

KWASHIORKOR ("SUGAR BABY")

Clinical signs

- Retardation of growth
- Loss of weight
- Edema (Hypoalbuminemia)
- Reddish yellow hair
- Skin with inflammatory changes
- The abdomen is distended
- Enlarged liver with fatty infiltration
- Irritability or apathy
- Frequent infections

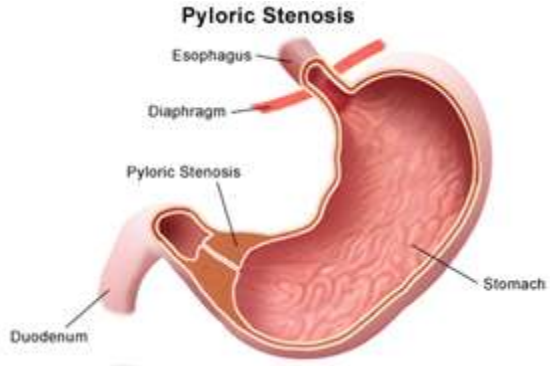


LABORATORY

- Iron deficiency anemia
- Serum albumin
- Cholesterol level
- Serum glucose
- Sodium, potassium
- Urine culture
- Stool examination

THERAPY

- Treatment of the illness causing hypotrophy



DIET: 1-st stage (Assessment of food tolerance)

- the aim is to achieve weight gain
- the amount of food is in relation to BW
- the kind of food is in relation to BW
- Small frequent feeding
- mother's milk or special milk formulas (rich in proteins)
- fluid therapy to correct dehydration
- antibiotics for bacterial infections

DIET
2-nd stage

- The diet increases slowly until energy requirements are met

- Supplements of
  - proteins
  - Vitamins
  - Enzymes
  - Iron

PROGNOSIS

- Good when the cause is nutritional disturbance

BARKER'S HYPOTHESIS (David Barker, UK)

- Undernutrition in utero has a long-term health effect and increases the risk of the cardiovascular diseases and type 2 diabetes
- These are children who were born SGA
- The period available for altering their poor growth prognosis is during the first two years of life

FAILURE TO THRIVE

- Lack of growth both in weight and height
- Most of them have emotional deprivation

OBESITY IN CHILDREN

INTRODUCTION

- Important health problem with long-term effect
- Increased incidence rate 10 – 25%
- Very difficult treatment
- Risk for Metabolic syndrome (association with other complications: hypertension, hyperinsulinism, diabetes type 2, dyslipidaemia)

DEFINITION

- An excess of body fat (in kilograms or as a proportion of BW - %BF)

- Body fat mass increases by:
  - Increasing fat cell number (Hyperplasia) – in children
  - Increasing fat cell size and lipid content (Hypertrophy) – in adults

CAUSES OF OBESITY

- Genetic predisposition
- Overeating
  - Food with high fat content
  - Food with rapidly absorbed carbohydrate (leads to rapid rise in PG and serum insulin,

    and subsequent reactive hypoglycaemia, resulting in more eating and food intake)

CAUSES OF OBESITY

- Low physical activity (leisure activity is watching TV, computer games)
- CNS and Hypothalamus damages (leading to appetite disorders)
- Endocrine disorders
- Psychosocial factors

CAUSES OF OBESITY

- Peptides:
  - Grelin (secretion from stomach - increases appetite)
  - Leptin (secretion from fat tissue - decreases appetite)
  - Adiponectin (secretion from fat tissue - increases insulin sensitivity)
  - TNF-alfa (secretion from fat tissue - increases insulin resistance by decreasing insulin receptor effect)

RISK FACTORS FOR CHILDHOOD OBESITY

- Family history of obesity
- High birth weight
- Bottle feeding (saturated fat content)
- SGA
- Low social class
- Single child
- Deprive home environment

PATHOGENESIS

- Positive energy balance (high energy intake or low energy expenditure)
- Primary disorder in fat metabolism (increased liposynthesis or decreased lipolysis)
- Sympatic NS action on energy balance

CLASSIFICATION OF CHILDHOOD OBESITY

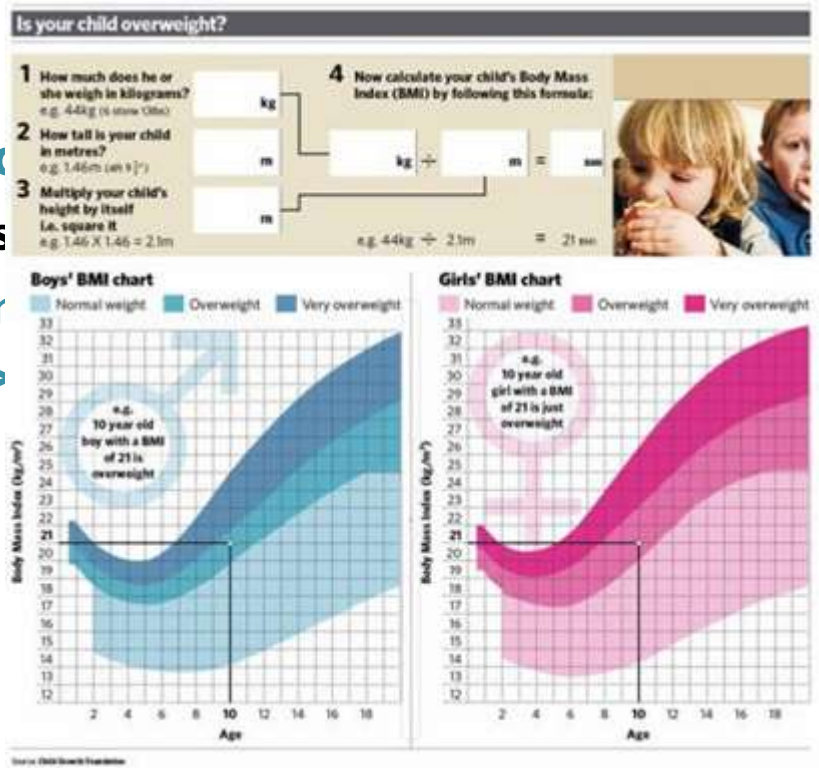
- **Primary type obesity (Simple obesity)**
- **Secondary type obesity (Complicated obesity):**
  - **Cerebral obesity (trauma, encephalitis)**
  - **Diencephal obesity (craniopharyngeoma, Hypothalamic syndromes)**
  - **Endocrine obesity (Hypothyroidism, GH deficiency, Cushing syndrome)**
  - **Chromosomal obesity (Down syndrome,**
  - **Prader-Willi syndrome, Laurence-Moon-Biedle syndrome)**

ASSESSMENT OF OBESITY

1. **Body weight (BW kg) – overweight more than 15% of normal BW**
2. **Body mass index (BMI):**

- **Formula**

  (BMI=BW kg/BH m2)
- **Assessment by standard**
  - **BMI > 95 centile – obes**
  - **BMI between 85 -95 cer**
  - **Obesity in adults: BMI >**



ASSESSMENT OF OBESITY

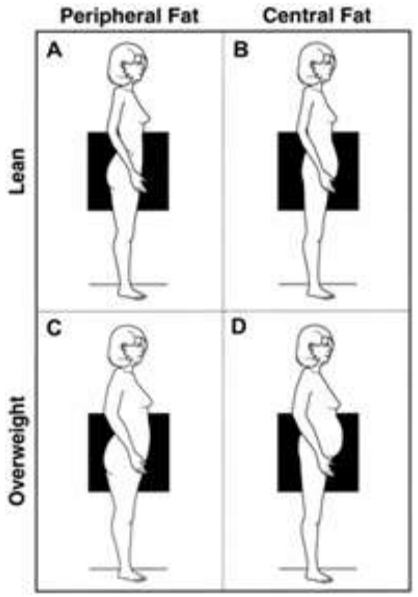
3. **Skinfold caliper** (measurement of the subcutaneous fat thickness)
4. **Degree** of obesity using **Weight for Height standards**:

- 1-t degree (+ 15 - 30% overweight)
- 2-d degree (+ 30 - 50% overweight)
- 3-rd degree (+ 50 - 100% ove
- 4-th degree (> 100% overwe

ASSESSMENT OF OBESITY

5. Body composition

- Lean body mass
- Fat mass:
  - a/Body fat amount
  - (kg BF or %BF)
  - b/Body fat distribution (Waist/Hip ratio or Waist circumference):
    - Upper type (Central, Android type – W/H > 0,8) – risk factor for longterm complications
    - Low type (Peripheral, Gynoid type – W/H < 0,8)
    - General type (until puberty – W/H = 0,85)

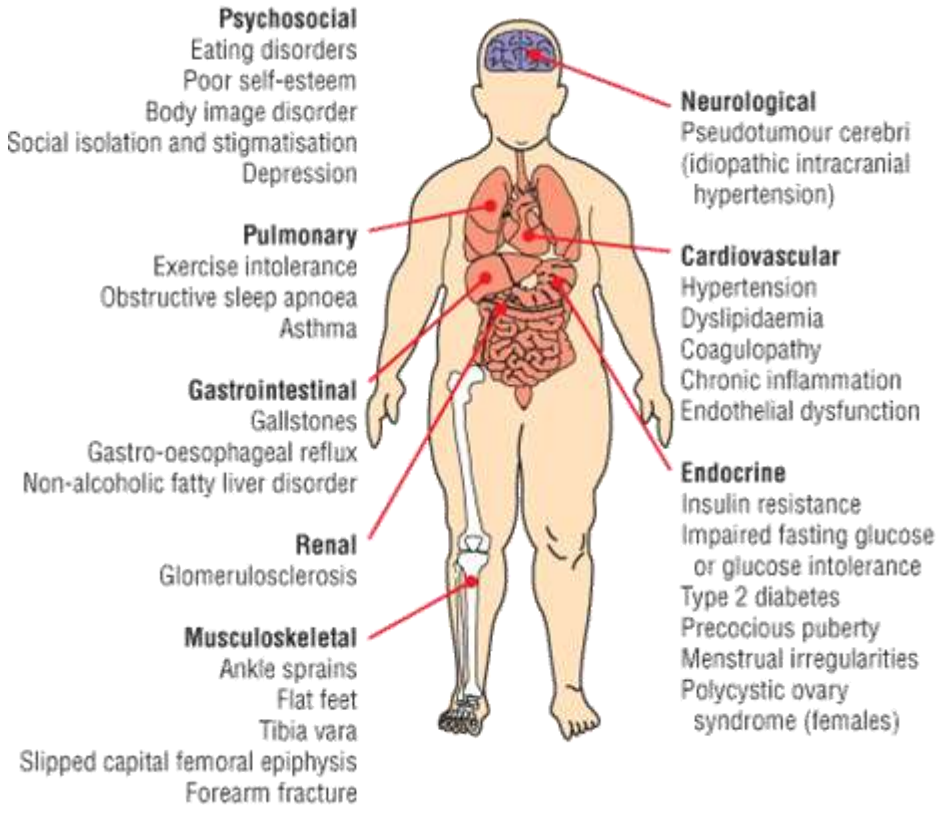


CLINICAL FEATURES

- Increased appetite (bulimia)
- Sweating
- Tiredness and pain in the low limbs
- Skin changes – acne, red striae, acanthosis nigricans
- Flat foot (Pes planus)
- Advanced physical growth
- Advanced puberty
- Advanced bone age
- Adipomastia

COMPLICATIONS

- Hypertension
- Pickwick syndrome
- Psychological disturbances
- Decreased working capacity
- Wheezing (due to asthma response to upper respiratory tract infections)

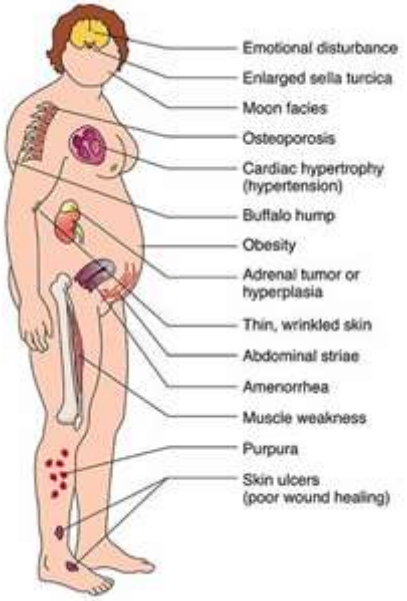


LABORATORY

- Hyperinsulinism
- Impaired glucose tolerance
- Serum cholesterol and triglycerides (above the normal range)
- Cortisol levels (normal or increased)
- Sexual hormones (testosterone increased in girls with PCOS)

DIFFERENTIAL DIAGNOSIS

- Polycystic ovary syndrome (PCOS)
- Cushing syndrome
- Dystrophia adiposogenitalia Frohlich
- Laurence-Moon-Biedle syndrome
- Prader-Willi syndrome
- Hypothyroidism
- Turner's syndrome



MANAGEMENT OF OBESITY

- Very difficult treatment
  (Fat cells hyperplasia)
- The first aim is to stop weight gain
- Combination of:
  - Low energy diet
    - Balanced diet
    - 3 or 4 mealtimes daily (1 small snack)
    - Energy intake 1000 – 2000 kcal/daily
    - Increased fibre content (fresh fruits, vegetables, cereals)
    - Low rapid absorbing carbohydrates (reducing of sweets, chocolate, biscuits, chips)
    - Low saturated lipids (skimmed milk)

MANAGEMENT OF OBESITY

- Physical activity (sport, walking)
- Drugs (Calorex, Cefamadar)
- Surgery (limited)

PREVENTION

- Healthy lifestyle
- Attention to: TV, Fast food, School lunches (hamburgers)
- Supervision of children growth

PROGNOSIS

It depends on:

- Early onset in infancy
- Severity of obesity
- Duration of obesity
- Complications