

Ministry of the Public Health of Ukraine
Zaporozhye State Medical University
Chair of General Hygiene and Ecology

**PHYSICAL DEVELOPMENT OF THE CHILDREN
AND TEENAGERS AS CRITERION OF THE
HEALTH.**

**HYGIENIC REQUIREMENTS TO CHILDREN'S
PRESCHOOL ESTABLISHMENTS AND
SCHOOLS.**

**HYGIENIC REQUIREMENTS TO LEARNING,
PHYSICAL TRAINING AND HARDENING
CHILDREN AND TEENAGERS.**

HYGIENE of CHILDREN'S NUTRITION.

The author: Volkova Yuliya Vladimirovna assistant of the Chair of
Hygiene and Ecology ZSMU

Hygiene of children and teenagers

the section of hygiene studying
action factors of environment on
a growing organism and
developing preventive actions
for preservation and
strengthening health of children
and teenagers

Primary goals HCT:

- studying physical development;
- development hygienic requirements to:
children's preschool and school
establishments,
hardening,
physical training children,
children's toys,
hygiene of work of schoolboys and teenagers,
hygiene of children nutrition;
- realization medical - professional consultations
at school

The basic methods research in HCT

- 1) Epidemiological method (studying state of health children's contingents depending on factors of environment);
- 2) Method of the sanitary description (sanitary inspection children's preschool establishments, schools etc.);
- 3) Method of sanitary examination (examination children's toys etc.);
- 4) Methods of laboratory experiments (for example, studying influence of harmful factors on a growing organism in experiments at laboratory animals)

Laws of growth and development children

- **Non-uniformity growth and development organism depending on age – than more youngly organism, that these processes go more intensively;**
- **Non-uniformity growth and development different bodies and systems in different age;**
- **Connection growth and development with a sex: unequal rates of growth and development at boys and girls;**
- **Influence on growth and development genetic factors, environmental factors and social conditions, disease;**
- **Influence of acceleration**

SCHEMES AGE PERIODIZATION

The biological periodization accepted in HCT:

- **The period new-born (1-10 days);**
- **Baby age - till 1 year;**
- **Earlier childhood - 1-3 years;**
- **The first childhood - 4-7 years;**
- **The second childhood - boys 8-12; girls - 8-11 years;**
- **Teenage age - boys 13-16; girls - 12-15 years;**
- **Youthful age - young men 17-21; girls - 16-20 years.**

Social age periodization:

- **Day nursery age - till 3 years;**
- **Preschool age - 3-7 years;**
- **Younger school age - 7-10 years;**
- **Middle school age - 11-14 years;**
- **Elder school age – 15-18 years.**

Physical development – complex of morphological and functional attributes, determining growth, formation organism of the child, stock of its vital forces, endurance and capacity.

Physical development - one of the major parameters describing state of health of the population and influence on it various factors.

THE PURPOSES

OF RESEARCH PHYSICAL DEVELOPMENT:

- **revealing laws of growth and development;**
- **estimation individual and population level of health;**
- **studying influence factors of environmental, social environment, genetic factors;**
- **estimation efficiency of treatment-and-prophylactic measures.**

METHODS RESEARCH PHYSICAL DEVELOPMENT

1. **Somatometrical (anthropometrical) - growth, weights of body and circle of chest.**
2. **Somatoscopical - the description the form of skeleton, backbone, chest, legs, development muscles, state of skin, sexual development by criteria Tanner.**
3. **Physiometrical - vital capacity of lungs, excursion chest, muscular force, arterial pressure, pulse.**

METHODS ESTIMATION PHYSICAL DEVELOPMENT

1. Method of indexes
2. Method of sigmal deviations
3. Method on scales of regress (regression sigma)
4. Method centyl lines (centyls)

1. Method of indexes, for example, index Broka: $\text{growth in sm} - 100 \text{ sm} = \text{Ideal weight in kg}$ (with coefficients on age).

2. Method of sigmal deviations. Sigma in statistics means average quadratic deviation. There are standard tables of physical development of children and teenagers on age and sex on the basis of statistical researches of the big contingents where it is underlined average indices of growth, weight of body and circle of chest with it sigma.

After definition somatometric parameters of the concrete child from it subtract value of average sizes from the table and difference divide on given sigma.

If quotient from division is from +1 up to -1 - development average (correspond to age norm);

(+1 - + 2) - is above the average;

(-1 - 2) - is lower than average;

more than (+2) or low (-2) - high or low development.

3. Method on scales of regress (regression sigma), showing on the basis of statistical researches what the mass of body and circle of chest should correspond to the given growth.

4. Method centyl lines (centyls). American method. Most used in pediatrics.

For research it is necessary not less than 100 children, available on increase of each parameter (growth, weight, circle of chest), thus the first child named 1 centyl, last - 100 centyl. Development is considered average between 16 and 84 centyls (+ - 2 sigma for 100 supervision). More often in pediatrics it use range 25-75 centyls.

CHILDREN'S PRESCHOOL ESTABLISHMENTS (CPE)

Kinds of CPE:

- kindergarten (for children 3-7 years),
- day nursery (till 3 years),
- children's combine (day nursery + kindergarten),
- children's home,
- preschool children's home,
- specialized CPE for children with infringements of development,
- preschool improving establishments for summer holiday.

HYGIENIC REQUIREMENTS TO CHOICE SITE OF CPE

- Availability to population - radius of service in city 300 m;
- Optimum hygienic conditions on the site (optimum microclimate, absence air pollution by chemical and physical factors, presence of green plantings).

- HYGIENIC REQUIREMENTS to site of CPE:

1. The area of site is 30-40 m² on 1 child.
2. There are must be 2 entrances - main and economic, the form of site - rectangular.
3. There must be special functional zones on site - principle of group isolation:
 - Zone building
 - Zone group play-grounds
 - Zone sports platforms
 - Economic zone
 - Zone green plantings

Requirements to functional zones at site of CPE.

ZONE BUILDING

Systems of building CPE

1. Centralized (is not good from hygienic position - all groups and economic premises (rooms) - in one building),
2. Decentralized (many buildings, need a lot of the place, expensive construction),
3. Block (modern projects - the block of day nursery, kindergarten, gymnasium, the economic block).

The building must be not closer 25 m from border of site, is surrounded with green plantings (trees - not closer 10 m, bushes – 5 m from a building – for the normal natural light exposure).

ZONE GREEN PLANTINGS

Should occupy not less than 50 % of the area of a site. Among plants there should not be with the prickles, rendering irritating and allergenic action, poisonous wild-growing plants

REQUIREMENTS TO the LAY-OUT of BUILDING CPE

Major principle of the lay out is the group isolation:

- 1) prevention infectious diseases,
- 2) opportunity of quarantine actions;
- 3) various mode of day in different age groups;
- 4) prevention traumatism at association children different age.

HYGIENIC REQUIREMENTS TO THE GROUP CELL

Group cell is the basic functional part CPE - the set of premises intended for 1 group of children.

Structure of group cell:

- reception - locker room
- group room (or separately game room, bedroom, dining room)
- buffet
- bathroom
- verandah (for day nursery groups)

Group room - the common room or is divided into game room and bedroom.

The general area is 4 m² on 1 child.

Microclimate: temperature of air 21-22⁰C (day nursery) or 18-20⁰C, humidity 40-60%, speed movement of air 0,1-0,3 m/s.

Ventilation: frequency rate - 3, volume ventilation on 1 child 20 m³/hour, CO₂ - up to 0,1 %.

Illumination: natural - LC 1/4-1/5, CNI - 1,5 %, corner of falling on tables 27⁰, corner of aperture – 5⁰;
artificial common illumination - 150 lux.

Hygienic requirements to toys in PCE:

- 1. Weight: till 3 years - up to 100 g, 3-7 years – 400 g, more than 7-10 years – 800 g.**
- 2. The sizes of fine details till 3 years - not less than 3 sm (may be aspiration small details).**
- 3. Material is food grades of rubbers and plastic. Paints must be not toxic, steady to disinfection, smell of paints till 3 years - 1 point, 7 years - 2 points.**
- 4. Application the toys which are badly can be disinfected (soft toys) is not recommended.**
- 5. Electric voltage in electric toys - up to 12 Volt**

Premises general purpose: gymnastic and music hall (75m²), methodical study, additional: swimming pool, visual hall, study for manual skills and drawing.

Medical premises: medical room, procedural study, isolator.

Administrative premises: study of the manager with a hall for realization meetings with parents, wardrobe for the personnel, washing and ironing, kitchen

HYGIENIC REQUIREMENTS TO SCHOOLS

Requirements to accommodation schools:

1. **availability (radius of service 1,5 km in city and 3 km - in village);**
2. **optimal hygienic conditions in a place of a site.**

Requirements to a school site:

The area - 20-50 m² on 1 pupil, the rectangular form.

Functional zones of school site:

- **Zone building**
- **Zone rest**
- **Educational - skilled zone**
- **Sports zone**
- **Zone green plantings**
- **Economic zone**

Zone building - building must be not closer 25m from borders of a site, is surrounded with a strip of protective green plantings (not closer 5-10m from a building – natural illumination at 1 floor).

Zone rest - 2 platforms for outdoor games for younger and senior classes, platform for silent rest, bench.

Educational - skilled zone - garden, kitchen garden, hothouses, educational workshops etc.

Sports zone - stadium with racetracks and holes for jumps, platform for volleyball, sports shells etc.

The economic zone - at the end of a school site is closer to economic entrance, is separated by green plantings.

Zone green plantings - not less than 40-50 % of the area of a site.

Requirements to school building

Systems of school construction:

- 1) Centralized (all premises in one building - old projects - high level of infections, noise, air pollution),
- 2) Pavilion type (many small buildings, it is accepted now for schools of sanatorium type),
- 3) Block type (blocks for younger, average, senior classes, for sports hall, kitchen).

The basic groups of premises in school:

Educational section

General purpose premise (lobby, wardrobe, dining room, sports hall, assembly hall, library etc.)

Office accommodations (studies of the director, teachers, a first-aid post, eating establishment)

**The basic functional unit in school is
educational section**

**Educational section - some classes or
studies, zone of recreation (hall,
corridor), bathroom**

**Unilateral building of a school corridor
with windows and halls is optimal.**

Hygienic requirements to a class room at school

The area must be 1,25 m² on 1 pupil, as a whole not less 50 m²

Microclimate:- temperature of air 18-22⁰C, humidity 40-60%, speed movement of air 0,1-0,3 m/s.

Ventilation: frequency rate - 4, volume ventilation on 1 pupil 20-30 m³/hour, CO₂ - up to 0,1 %.

Illumination:

- natural: LC 1/4-1/5, CNI - 1,5 %, corner of falling 27⁰, corner of aperture – 5⁰;

-artificial: common illumination 150 lux (luminescent lamps - 300 lux).

REQUIREMENTS TO SCHOOL DESKS

(TABLES):

In each class must be desks not less than 3 sizes, are placed in 3 lines,

distance between lines 0,7m,

distance up to school board 2,5m,

distance up to walls 0,5m.

At schools are used desks 6-12 sizes having multi-colored marks for the teacher.

Formula Listov

№ school desks = 2 first figures of growth - 5

Hygienic specifications of school furniture

1. **Differentiation - vertical distance from a table to chair – must be $1/7-1/8$ part of growth or from the lowered elbow to sitting.**
2. **Distance of sitting - horizontal distance between edge of table and edge of sitting – must be (- 4 –5) sm.**
3. **Distance back of chair - horizontal distance from edge of table up to back of sitting = front-back section of a body + 3-5 sm.**
4. **Height of sitting - length of a shin + 2 sm.**

Hygienic requirements

to learning children and teenagers

In difficult process of learning children it is possible to allocate 2 main stages:

- 1) Development skills of long sitting, the letter, reading, concentration of attention - preschool stage (in preschool establishments, houses etc.);
- 2) Stage of accumulation knowledge, development logic and abstract thinking – it is at school, technical training college, in high school. It is the most difficult stage.

Ways of adaptation to learning

at school - 1-st stage:

Gradual change of dynamic stereotype - mode of day of the child:

- In 3-5 years - 2 lessons till 15-20 minutes as game;
- In preschool group - 4 days per one week with 4 lessons by the common duration 1 hour 50 minutes per day;
- In 1 class - up to 20 lessons per one week on 35 minutes (no more than 4 lessons per day).

Age of the beginning learning at school

It is determined not by calendar age, but psycho-physiological features of the child, his physical development, state of health. It is the important problem for the pediatricist.

There are some psycho-physiological tests for definition readiness for learning at school (for example, test Kern-Ierasik).

PREVENTION EXHAUSTION AT SCHOOLCHILDREN:

- 1) **Creation optimum hygienic conditions of learning: normal light exposure, ventilation, microclimate, observance MPL of noise etc. harmful factors.**
- 2) **Optimization mode of learning - correct drawing up the schedule of lessons, correct construction of a lesson, effective utilization breaks, optimum mode of day;**
- 3) **Optimization and revision schedules of lessons.**

HYGIENIC REQUIREMENTS TO THE SCHOOL SCHEDULE:

a) Restriction amount of lessons per one week:

in 1 class - up to 20 on 35 minutes,

2 class - up to 22 on 45 minutes,

3-4 class - 24 on 45 minutes,

5-8 class - 30 on 45 minutes,

in 9-11 class - 31 on 45 minutes;

b) Distribution lessons on complexity within day and weeks:

Scale complexity of lessons - the exact sciences - 11 points, singing - 1 point.

Requirements: it is impossible to put 2 difficult lessons together, in the beginning and at the end of day and week. A maximum of complexity of lessons must be on Tuesday – Wednesday (middle of the week).

Hygienic requirements to structure lesson

Phases serviceability of schoolboys :

- ❑ Phase in-work is in the first 5 minutes,
- ❑ Phase of working excitation - 5-25 minutes,
- ❑ Phase beginning exhaustion.

Recommendations for construction of a lesson:

- ❑ The prologue must be 10 minutes,
- ❑ The basic part (explanation new material) - up to 25 minutes,
- ❑ The final part – repetition, writing homework

HYGIENIC REQUIREMENTS TO MODE OF DAY OF CHILDREN AND TEENAGERS.

Main principles of hygienic requirements:

- **Conformity to daily biorhythms of the child;**
- **The maximal preservation of a dynamic stereotype, if necessary - its gradual change (the new mode should be entered gradually);**
- **Rational distribution of the basic components of a mode of day (dream, study, games, stay on air, a feed, personal hygiene) within day and their alternation;**
- **Conformity to limits of serviceability and to psycho-physiological opportunities of the child.**

THE BASIC COMPONENTS of DAY REGIMEN of CHILDREN And TEENAGERS

**1. Dream. In the new-born age - dream
inordinate - 16, 5 clocks.**

Day dream: at 1,5 - 2 years - 2,5 - 3 hours.

From 3 up to 6 - 7 years - 2 - 1,5 hours.

Night dream:

1 year - 7 years - 10 h. 40 min. - 10 h. 15 min.

From 8 years dream only at night:

8 - 10 years - 10 hours

11 - 14 years - 9,5 - 9 hours

15 - 17 years - 9 - 8 hours

2. Stay on fresh air

Up to 1,5 years stay on open air is at the day dream.

At 2 - 3 years - not less than 4,5 - 5 clocks per day (2 walks - in PCE and house before dream)

At 4 - 6 years - 4,5 - 3,5 hours

At 7 - 10 years - 3,5 hours

At 11 - 14 years - 3 hours

At 15 - 17 years -2,5 hours

3. Educational activity per week

At 1,5 - 2 years - some lessons on 8 - 10 minutes

At 3 - 4 years -10 lessons on 10 - 15 minutes

At 4 - 5 years - 10 lessons on 20 minutes

At 5 - 6 years - 15 lessons on 20 - 25 minutes

At 6 - 7 years - 19 lessons on 25 - 30 minutes

At school: 1 class - 20 lessons on 35 minutes,

2 classes - 22 lessons 45 minutes,

3-4 classes - 24 lessons,

5 - 8 classes - 30 lessons,

9 - 11 classes - 31 lessons.

4. Game activity or rest:

**In preschool age - 4,0 - 5 hours
for schoolboys - 1,5 - 4,0 hours.**

5. Receptions of nutrition and personal hygiene:

2,5 - 4 hours per day (morning, evening toilet, charging, hydro procedures, changing clothes, transferrings, receptions of nutrition).

HYGIENIC REQUIREMENTS TO PHYSICAL TRAINING OF CHILDREN:

Main principles:

- **Individuality;**
- **Adequacy to a state of health and opportunities of organism;**
- **Systematic;**
- **Gradual increase loading at the medical control;**
- **Favorable psycho-emotional condition and conditions of Environment.**

FEATURES of HYGIENE of NUTRITION of CHILDREN

The main feature - high intensity exchange in organism of the child, thus a feed should not only compensate losses of energy, but also provide synthetic processes of growth and development of organism.

Therefore - caloric content of a feed on kg of weight of a body in 1,5 - 2 times are higher, than at the adult and it should exceed losses of energy.

FEATURES PROTEIN NUTRITION IN CHILDREN:

- ❖ **More on kg of weight of a body in comparison for the adult;**
- ❖ **The big part of animal protein - 60-75 %, especially ;**
- ❖ **Obligatory presence conditionally irreplaceable amino acids arginine and histidine, and also irreplaceable amino acids lysine and tryptophan (factors of growth).**

FEATURES FATTY NUTRITION:

- ❖ **A lot on kg of weight of a body;**
- ❖ **A lot of animal fats, vegetative fats – not more than 10% - if it more - inhibition growth, lack vitamins A and D.**

FEATURES CARBOHYDRATE NUTRITION:

- ❖ - Rather big need on kg of weight of a body (energy);
- ❖ In comparison with the adult person in children's feed must be many unprotected carbohydrates (up to 20 %) and pectins, less super protected carbohydrates (vegetative cellulose).

FEATURES VITAMINS IN CHILDREN'S NUTRITION

In view of intensive growth more vitamins are necessary, is especial A, D and groups B.

FEATURES MINERAL SUBSTANCES IN CHILDREN'S NUTRITION

In view of intensive growth bones - increased receipt Ca and P, because it participates in forming bones.

Enough magnesium - 12-13 mg/day is necessary.

The basic products of children's feed – dairy - do not provide need in Fe, therefore are necessary sources of its additional receipt.

REGIMEN OF DIET

**Than more small child - the more often receptions of food is necessary:
at preschool children 5 times with break 3 hours,
at schoolboys - 4 times in 4-5 hours.**

More uniform distribution caloricity on receptions of food is recommended in comparison with adults.

Thanks for attention