

**ЗДОРОВ'Я ЛЮДИНИ, ФІТНЕС І РЕКРЕАЦІЯ,  
ФІЗИЧНЕ ВИХОВАННЯ РІЗНИХ ГРУП НАСЕЛЕННЯ**

**THE IMPACT OF NUTRITION OF PRIMARY SCHOOL CHILDREN  
ON THE DEVELOPMENT OF PHYSICAL QUALITIES**

**ВПЛИВ ХАРЧУВАННЯ ДІТЕЙ ПОЧАТКОВОЇ ШКОЛИ  
НА РОЗВИТОК ФІЗИЧНИХ ЯКОСТЕЙ**

Babak S. V., Yakubchik M. I.

*National University of Ukraine on Physical Education and Sport,  
Kyiv, Ukraine*

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**Summaries**

Primary school plays an extremely important role in laying the foundations for the development of a holistic personality. Motor activity is a necessary condition for maintaining the normal functioning of the human body. School physical education has a significant impact on a person's biological development, as well as on one's healthy lifestyle.

Early school age is an important period in the development of basic body functions, as well as physical qualities that not only reflect the level of physical fitness of students, but also contribute to the adaptive properties of the body. Education of physical qualities contributes to the formation of physical and mental capacity, fuller realization of the potential of students. Physical development of primary school children is extremely important in the development of physical body and mental abilities. Compliance with the relevant standards is evidence of the normal development of motor activity of the student. Few people have studied the dependence of a child's physical activity and compliance with standards of one's diet.

Research was conducted on physical fitness of children 7–9 years old, namely: in physical education classes determined compliance with standards of exercise (according to the curriculum for secondary schools) that reflect such physical qualities as speed, agility, strength, flexibility and endurance. The data were then compared with each child's exercise and diet.

According to our research, it can be affirmed that children who eat properly are able to comply with physical standards of physical fitness. Children who eat irrationally cannot meet the standards sufficiently. That is, nutrition affects physical fitness, which is an important basis for a child's health.

**Key words:** children 7–9 years old, exercise, physical qualities, diet.

Початкова школа відіграє надзвичайно важливу роль у закладанні основ розвитку цілісної особистості. Рухова активність є необхідною умовою підтримання нормального функціонування організму людини. Шкільне фізичне виховання виявляє значний вплив на біологічний розвиток людини, а також на її здоровий спосіб життя.

Молодший шкільний вік – важливий період розвитку основних функцій організму, а також фізичних якостей, які не тільки відображають рівень фізичної підготовленості учнів, але і сприяють підвищенню адаптивних властивостей організму. Виховання фізичних якостей сприяє становленню фізичної і розумової працездатності, більш повної реалізації потенціалу учнів. Фізичний розвиток дітей початкової школи є надзвичайно важливим у розвитку фізичного тіла та розумових здібностей. Виконання відповідних нормативів є свідченням про нормальний розвиток рухової активності школяра. Мало хто досліджував залежність рухової активності дитини, виконання нормативів від її харчового раціону.

Проводили дослідження фізичної підготовленості дітей 7–9 років, тобто на уроках фізичної культури визначали відповідність нормативам (згідно з навчальною програмою для загальноосвітніх шкіл) виконання фізичних вправ, що відображають такі фізичні якості, як: швидкість, спритність, сила, гнучкість та витривалість. Потім співставляли дані із виконанням фізичних вправ та харчуванням кожної дитини.

Згідно з нашими дослідженнями, можна стверджувати, що діти, які правильно харчуються, здатні виконувати фізичні нормативи із фізичної підготовленості. Діти, які харчуються нераціонально, не можуть достатньою мірою виконати нормативи. Тобто харчування відбивається на показниках фізичної підготовленості, що є важливою підставою для здоров'я дитини.

**Ключові слова:** діти 7–9 років, фізичні вправи, фізичні якості, харчовий раціон.

Начальная школа играет очень важную роль в закладке основ развития целостной личности. Двигательная активность является необходимым условием для поддержания нормального функционирования организма человека. Школьное физическое воспитание оказывает значительное влияние на биологическое развитие человека, а также на его здоровый образ жизни.

Младший школьный возраст – важный период развития основных функций организма, а также физических качеств, которые не только отражают уровень физической подготовленности учащихся, но и способствуют повышению адаптивных свойств организма. Воспитание физических качеств способствует становлению физической и умственной работоспособности, более полной реализации потенциала учащихся. Физическое развитие детей начальной школы чрезвычайно важно в развитии физического тела и умственных способностей. Выполнение соответствующих нормативов является свидетельством нормального развития двигательной активности школьника. Немногие исследовали зависимость двигательной активности ребенка, выполнение нормативов от его пищевого рациона.

Проводили исследования физической подготовленности детей 7–9 лет, а именно на уроках физической культуры определяли соответствие нормативам (согласно учебной программе для общеобразовательных школ) выполнения физических упражнений, отражающих такие физические качества, как скорость, ловкость, сила, гибкость и выносливость. Затем сопоставляли данные по выполнению физических упражнений и питанием каждого ребенка.

Согласно нашим исследованиям, можно утверждать, что правильно питающиеся дети способны выполнять физические нормативы по физической подготовленности. Дети, питающиеся нераціонально, не могут в достаточной степени выполнить нормативы. То есть питание отражается на показателях физической подготовленности, что является важным основанием для здоровья ребенка.

**Ключевые слова:** дети 7–9 лет, физические упражнения, физические качества, пищевой рацион.

**Introduction.** Today, the problem of children's health is more urgent than ever. Primary school plays an extremely important role in laying the foundations for the development of a holistic personality. Motor activity is a necessary condition for maintaining the normal functioning of the human body. School physical education has a significant impact on a person's biological development, as well as on one's healthy lifestyle [6].

Early school age is an important period in the development of basic body functions, as well as physical qualities that not only reflect the level of physical fitness of students, but also help to improve the adaptive properties of the body. Education of physical qualities contributes to the formation of physical and mental capacity, fuller realization of the potential of students [1; 15; 16].

Today, nutrition occupies a prominent place among the sciences. It is important to review nutrition in terms of age groups. Proper nutrition for school-age children is a guarantee of strong immunity, good performance and health. Much attention has been paid to this topic, but some issues have remained completely unresolved [2; 3; 8; 10; 11; 13; 18]. In particular, this applies to the interrelation between nutrition and physical activity.

**Material and methods.** The research was conducted in Glibiv Secondary School of 1–2 grades for 16 months. The study involved 94 children aged 7–9 years old (47 boys and 47 girls).

The performance of physical exercises that develop such physical qualities as: strength, agility, speed, flexibility and endurance, was recorded during physical education classes.

At the same time, children were asked to keep records of their daily diets. We analyzed the data in terms of identifying the correlation between the development of physical qualities of the child and one's nutrition.

Among 7–9 years old children, 2 groups were formed (both boys and girls). 1st groups are children who ate rationally, 2nd groups are children who ate irrationally.

We held meetings with children and their parents, provided them with the necessary information about age nutrition. We also acquainted children and adults with the results of our research.

Research was conducted on physical fitness of children 7–9 years old, namely: in physical education classes determined compliance with standards of exercise (according to the curriculum for secondary schools) that reflect such physical qualities as speed, agility, strength, flexibility, endurance [4]. The data were then compared with each child's exercise and diet.

Working with children 7–9 years old, such pedagogical methods as lectures, conversations, surveys, observations were used.

The results of the sample analysis were statistically processed using Excel 2000. The probability of the difference between the mean values was determined by the Student's t test.

**Research results.** We analyzed the daily food menu of schoolchildren – children 7–9 years old. Children of two 1st grades showed the following results. Among the 32 students were 16 boys and 16 girls. Analysis of diets showed the following. Of the 16 boys, seven ate rationally (group 1) and nine ate irrationally, breaking their nutritional state (group 2).

When analyzing the diets provided to us by 8-year old children, it was found that among 30 students (16 boys and 14 girls) – 9 boys and 7 girls ate irrationally, the rest ate rationally.

Regarding third-graders (age 9), we observed the level of physical fitness of 32 students (15 boys and 17 girls). We also invited these children to bring records of their diets, which we analyzed. As a result, we found that out of 15 boys – 9 eat irrationally, and out of 17 girls – 10 eat irrationally.

The diet of boys and girls of the second groups of students of grades 1–3 was dominated by fatty foods, sausages, bakery products made of white flour. The diet was limited to greens, fresh vegetables and fruits. These children often did not follow a proper diet.

Initially, in physical education classes, students learned various exercises that develop basic physical qualities. Upon completion of the study, according to the program, the children passed the standards. We collected data on the implementation of physical standards by children in grades 1–3. Below are just a few of them. Namely, such indicators as: 30 meters run, shuttle running, long jump, lifting the torso into the seat for 1 minute, tilting the torso forward from a sitting position, 1000 meters run.

30 meters run demonstrates and develops such a physical quality as speed.

Literature sources indicate that the most favorable period for the development of speed abilities is the age range from 7 to 11–12 years.

Children (both boys and girls) who ate rationally showed results at speeds close to the standard for the 30 meters run for 7-year old. As for children who ate irrationally, the results were 11.1 % (boys) and 6.2 % (girls) higher than the standard. Significant differences ( $p < 0.05$ ) were found between the 1st and 2nd groups.

A similar pattern was observed in children aged 8 and 9 years.

Another important physical quality that students need to develop is agility – the ability to coordinate movements, master new ones, be able to quickly switch from one movement to another, depending on the requirements of a changing environment. Any physical exercises can be used to develop agility. Agility develops rather slowly. The greatest changes in coordination of movements are observed in children from 7 to 12–13 years old. The foundation is laid for mastering complex skills in the coming years [12].

The research showed compliance with the standards of the results of shuttle running  $4 \times 9$  m (type of agility test). When performing this exercise, children of 1st groups of 7–9 years old (both boys and girls) showed quite good

results, almost standards. And the children of the second groups showed results far from the standards.

Exercise results that inform about the state of such a physical quality as strength (long jumps and lifting the torso to the seat in 1 minute) are best in children who eat properly. The results are almost similar in grades 1–3. Significant differences between the 1st and 2nd groups in all three grades in this indicator were found in boys and girls in the 2nd and 3rd grades.

One of the most important conditions for the development of physical skills in children of primary school age is the correct and competent development of the flexibility of the growing organism. Purposeful development of flexibility should begin with 6–7 years. This is due to the high extensibility of the musculoskeletal system in children of this age. The development of flexibility in younger students can be determined by a simple exercise – tilting the torso forward from a sitting position.

Analysis of the results of the exercise on flexibility of the children we studied, showed that the flexibility of children in other groups does not meet the standards. The indicators for girls are almost twice as bad as the standards. In boys who eat irrationally, the results of flexibility exercises are 40 % lower than the results of seven-year-olds, according to regulations. Improper nutrition may help to strengthen ligaments and tendons, so flexibility is quite weak.

An important physical quality necessary for exercise, as well as in everyday life is endurance – the ability to perform any activity for a long time without reducing its effectiveness, the ability to resist physical fatigue during muscle activity.

The endurance exercise planned in the elementary school physical education programs is the 1000 meters run.

Endurance in children is formed and developed gradually, with long repetitions of exercises. Our research showed that the first-graders of the first groups (both girls and boys) performed at a level of “satisfactory”. But as for children who ate irrationally, their performance is weak. They did not meet the standards. The biggest differences in standards were shown by first-graders.

The endurance of 8-year old is as weak as that of 7-year old. However, the indicators are slightly better. Most likely, the reason is that children to some extent developed this physical quality in physical education lessons during the school year. On average, the children of the first groups showed results that correspond to the grade “good”. And children of 2nd groups scored the lowest points – 1–2.

If we compare children aged 7, 8, 9, in the first groups with increasing age there is a positive trend to improve endurance. This can be explained by the fact that children have developed endurance during school. On the other hand, their muscle mass has increased. Some children began to participate in sports and choreography sections and clubs. These commonalities also affected children who ate irrationally. But their performance is much worse, which gives us reason to believe that one of the reasons, after all, is nutrition.

Thus, in total, among the 94 children studied – among boys – 20 ate rationally, 27 – irrationally. Among girls – 22 ate rationally, 25 – irrationally. In total, children with rational nutrition – 42, with irrational – 52 (55.3 %). That is, more than half of children grow up with the wrong dietary support. This is quite a big number and a big problem.

Based on the dietary analysis of the nutrition of the studied children, conclusions can be drawn. Children’s nutrition problems have been identified: less than half of these children eat vegetables and fruits every day, but there are many children who consume unhealthy sweets.

The results of research show that the factor of proper nutrition of children, the use of sufficient amounts of vegetables and fruits, regular consumption of soft drinks and juices, moderate consumption of sweets, a balanced diet of essential nutrients are the basis for maintaining good health, energy balance between calories occur in the body [10]. The research showed:

– less than half of schoolchildren aged 7, 8, 9 eat vegetables and fruits daily (44.5 % of boys and 43.3 % of girls, respectively). Currently, the group of children who eat vegetables “sometimes” and “never” is 20.9 %;

– of soft drinks, 4.2 % consume more juices every day, and 4.6 % “almost always”. More than half of the children (57.0 %) “have never tried them”, 33.4 % – “sometimes consume”;

– high consumption of chocolate and sweets was found (45 % of children);

– high consumption of white bread and rolls was found (58 % of children).

The information obtained indicates low dietary awareness of parents.

Based on the analysis of scientific literature, we conducted interviews and mini-lectures with children and some parents on age-related nutrition.

Recommendations for the organization of proper nutrition for primary school students.

Nutritionists suggest uphold the following principles of healthy eating for schoolchildren:

*Caloric content.* When creating a rational program for each day, it is necessary to consider the child’s energy expenditure. Elementary school students have their own calorie intake, which is not more than 2400 kcal.

Children who are active in sports need an energy-intensive diet, so they should consume 300 kcal more.

*Diversity.* This is one of the main principles of creating a menu, the only way to provide the body with essential amino acids.

*Regime.* The child’s diet should be regular, changes between meals should be regulated.

*Balanced diet.* The presence of animal proteins in the diet is considered mandatory. Fast-breaking carbohydrates should be no more than 20 %.

*Vitamins.* Fruits and vegetables should be included in the diet of children.

It is necessary to study the individual characteristics of the child. It is important that children eat fish at least once or twice a week. Dairy products should be consumed daily, especially yogurt, milk, cottage cheese [2; 3].

School-age children need to be taught independence. Breakfast can be scheduled for 7–8 am. Snack for 10–11 am at school, during breaks. Lunch can be held either at home or at school. Plan dinner for 7–8 pm. Proper nutrition for school-age children means that

breakfast and lunch should be the most energy-intensive, but it is better to have dinner two hours before bedtime.

**Discussion.** When analyzing the literature on the development of speed abilities, it was found that the most favorable period for development is the age range from 7 to 11–12 years. Later, from 12 to 14–15 years, the increase in these indicators increases to a much lesser extent. This is due to the stabilization of simple motor response time and tempo indicators [17]. Important role in the process of sports training in the development of movement’s speed plays a pattern of transfer of physical abilities. This is due to the fact that the impact on strength and speed-power abilities will have a positive effect on the development of actual speed abilities.

Many sources state that the achievement of maximum results in the chosen sport depends on two mutually influencing factors: the effectiveness of the methods used and the muscle composition of the child’s body (confirmed dependence of running speed on muscle composition). Therefore, the noted specific features of speed abilities require the use of each of their varieties of appropriate tools and training methods [5; 7]. Speed exercises are performed with maximum or near-limit speed (V. I. Lyakh, 2006).

An indicator of agility is the coordination complexity of movements. This takes into account the time required to master complex movements, and the degree of readiness that is achieved in this movement after exercise and games. As mentioned above, agility develops rather slowly.

In order to develop agility, as the ability to transform movement in connection with a changing environment, moving games, running and other exercises widely used in the field related to overcoming obstacles and orientation, it is very important to constantly update exercises, change the conditions of their application.

Systematic learning of new exercises with children leads to the development of agility. Training increases the plasticity of the nervous system, improves coordination of movements and develops the ability to master new, more complex exercises.

The development of agility is facilitated by performing exercises in changing conditions. For primary school students, the most effective means of developing agility is play, because the game method makes it more accessible to study complex exercises. Moving games help to revive and diversify agility exercises.

Thus, in mobile games, children have to constantly switch from one movement to another; quickly, without any delay to solve complex motor problems, agreeing with the actions of their peers [9].

In the early school years, there is an increase in muscle mass, muscle strength increases. Large muscle groups develop more rapidly. Children of this age are able to move with great amplitude. Strength training exercises to overcome one's body weight in an inclined and upright position are used. The small groups of muscles responsible for the accuracy of movement (foot muscles, hand muscles) are underdeveloped. Therefore, every lesson should include exercises that involve a small group of muscles [16].

Muscles in infants have thin fibers, low in protein and fat, and contain a lot of water, so they need to develop gradually and in many ways. Large loads and especially load intensities should be avoided, as they lead to high energy consumption, which can lead to a general delay in growth. Caution in the dosage of exercises and their selection is also due to the fact that the autonomic function of movements lags behind the development of motility. Work on the development of strength qualities should be built in compliance with the general didactic principles: gradualness, accessibility, in accordance with the age and individual characteristics of children.

One of the most important conditions for the development of physical skills in children of primary school age is the correct and competent development of the flexibility of the growing organism [20].

Flexibility is understood as morphological and functional properties of the musculoskeletal system that determine the amplitude of various human movements. This term is more appropriate

to assess the total mobility in the joints of the body. Insufficient mobility in the joints limits the level of strength, speed and coordination skills, leads to impaired intramuscular and intermuscular coordination, reduced efficiency. This is often the cause of damage to muscles and ligaments, i. e. sports injuries [6].

Purposeful development of flexibility should begin with 6–7 years. At children of 9–14 years this quality develops almost 2 times more effectively, than at senior school age. This is due to the high extensibility of the musculoskeletal system in children of this age. Mobility in the joints develops unevenly at different ages. In children of primary and secondary school age, active mobility in the joints increases, then it decreases. The amount of passive mobility in the joints also decreases with age. Moreover, the older the age, the smaller the difference between active and passive mobility in the joints. The most favorable period for the development of passive flexibility will be the age of 9–10 years, and for active – 10–14 years.

Younger students have all the prerequisites for the acquisition of flexibility: the predominance in bone tissue of organic elements of water, which make the skeleton flexible and elastic; bone joints are mobile; gradual replacement of bone cartilage; formation of natural physiological curves (lordosis and kyphosis), etc. [5].

In order for joints and ligaments to stay healthy for a long time, they need to be “fed” with useful products with the maximum content of necessary elements. They contain important micro- and macroelements.

Be sure to include foods in your child's diet:

- iron; contained in red meat (fat-free) and eggs;
- magnesium; most magnesium can be found in green vegetables, fruits and berries, buckwheat honey, dried fruits;
- organic calcium; the maximum amount is contained in dairy products;
- organic phosphorus; in large doses is found in fish and seafood;
- mucopolysaccharides; in the required amount contained in gelatin, seaweed, tendons, ridges, cartilage [3].

But including healthy foods in the diet is only half the battle, and the most important and difficult thing is to teach your child not to eat unhealthy foods, which usually contain sweeteners and flavor enhancers. Therefore, they are delicious and attract children. But they are not only not useful, but also harmful [3; 19].

All vitamins are necessary and useful for the growing body, and for the joints are especially important vitamins – D, F and C.

One should not eat fatty meat and whole milk. Harmful are junk food (fast food, crackers, popcorn, etc.), which damage all body systems, including joints. Sweets (cakes and pastries, halva) promote rapid excretion of calcium, which adversely affects the health of joints and ligaments [3].

Endurance is an important physical quality necessary for exercise, as well as in everyday life. Endurance is the ability to withstand physical fatigue during a given muscular activity.

According to Y. G. Travin, the measure of endurance is the time during which muscle activity of a certain nature and intensity is performed. Thus, endurance is measured by the time of maintaining a certain level of muscle activity.

Scientists do not agree on the age at which it is better to develop endurance without compromising the health of students. Some authors express the view of the need for early development of endurance, and consider that long runs, swimming, skating, etc. are not harmful to the child's body [14].

Other scientists consider it is possible to begin the development of general endurance in adolescence. Endurance in elementary school physical education programs develops 1000 meters run.

**Conclusions.** One of the most important natural needs of the human body is motor activity, or movement. It forms the structure and functions of the human body. During the long evolutionary development of man, there was a close connection between his motor functions and the activity of internal organs. During the period of human growth and development, movement stimulates metabolism and energy

in the body, improves heart and respiratory function, as well as the functions of some other organs that play an important role in human adaptation to ever-changing environmental conditions. High mobility of children and adolescents has a beneficial effect on their brain, promoting the development of mental activity. This is especially important in childhood and adolescence, when there is an active physiological and psychological development of the child.

Childhood is an important period for the formation of the foundations of a healthy body. The school environment can provide opportunities to understand the importance of healthy eating and physical activity.

Age from 7 to 10 years can be called favorable for the establishment of almost the entire range of physical qualities and coordination abilities realized by physical activity. If such a base did not occur during this period, then the time for the formation of the physical and physiological basis of the future physical potential of individual can be considered irretrievably lost. After all, in this case, all further steps of individual in this direction will be contrary to the basic laws of motility development of the human body. Therefore, the organization of the correct training regime of the child in physical education lessons in order to ensure its general physical fitness and the predominant focus on the development of motor coordination is the most adequate to the age characteristics of human physical development in this period of life.

Physical education in physical education classes is extremely important, especially today, when hypodynamia is growing.

In addition to hypodynamia, the diet of younger students has a very significant impact on physical development.

Physical qualities (strength, speed, agility, flexibility, endurance) that students develop in physical education classes are the basis for the development of a healthy body and the basis for performing physical actions in everyday life.

According to our research, it can be claimed that children who eat properly are able to comply with physical standards of physical

fitness. Children who eat irrationally cannot meet the standards sufficiently. That is, nutrition

affects physical fitness, which is an important basis for a child's health.

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