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The primary school kids' morphological status of Pavlodar city

Abstract: More attention is paid to the study of the peculiarities of physiological processes occurring in the growing body, since the formation and protection of the health of children, adolescents is the main task of any state. The purpose of this research is to study the features of the morphological development of children of primary school age in Pavlodar city.

The study of anthropometric parameters of schoolchildren (boys and girls) 9-11 years of Pavlodar was conducted. Studied were such variables as body length (BL), body mass (BM), circumference of the chest (CC), calculated the Quetelet index (QI) and stenia index (SI).

Within the scope of research, differences in physical development between boys and girls were revealed. For example, in terms of length, body weight, boys are superior to girls aged 9-10 years, while at 11 years of age girls are more important in these parameters, which is explained by earlier entry into the puberty period compared to peers. According to such indicators as the Quetelet and stenia index, significant sexual differences were observed only at the age of 9.

Thus, the study of the physical development of boys and girls 9-11 years showed an increase in the ontogenesis of anthropometric indicators. An increase in the Quetelet index in the compared age of both sexes was revealed, which characterizes the growth processes. Stenia index in ontogenesis decreased in both sexes.

Keywords: morphological development, anthropometric indicators, health of schoolchildren, physical development, total body size.

It is well known that one of the direct indicators of health, the most reflecting the balance of the body with the environment, is physical development. The close relationship between health and physical development is especially pronounced in the school period, which determines the relevance of the physical development study [1].

Introduction. With the long-term impact of negative factors, such as malnutrition, physical inactivity, marked intensification of the educational process, which is expressed in increasing the volume and complexity of educational material and the number of lessons per day, leads primarily to disharmonious physical development, and thus to a decrease in the number of absolutely healthy children [2]. In this connection, the main direction of the domestic policy of any state is the formation and protection of the children's health, adolescents and young people as the future of the country [3;4]. In this regard, the most promising direction of work is the formation of a new hierarchy of values in a person, where his own health is a necessary condition for the successful self-realization of the individuals' potential opportunities [5].

The purpose of this research is to study the features of the morphological development of primary school age children's in Pavlodar city.

Materials and methods. The survey of schoolchildren was conducted in February 2018. The study involved 120 students of secondary school № 22 of Pavlodar (all of Kazakh nationality) aged 9-11 years. From them, 60 are boys and 60 are girls. All examinations were performed in the first half of the day, as during this period the studied indicators are the most stable.

The total body size was measured using the standard anthropometric method [6]: body weight (BW) was determined using medical scales, to measure the length of the body (LB) a wooden growth meter was used, the measurement of the chest circumference (CC) was carried out using a centimeter tape. Quetelet index (QI) is defined as the body mass (BM) divided by the square of the body height (BH), and is universally expressed in units of kg/m², resulting from mass in kilograms and height in meters. Stenia index (SI) is body length (BL), cm divided by (2 x body weight, kg (BW)+ chest circumference, cm (CC)) [7].

Statistical processing of the obtained data was performed using a standard program package Statistica 6.0. Quantitative data are presented in the form of averages (M) and arithmetic mean

error (m) in the normal distribution of indicators. The statistical significance of differences was determined by the student's paired t-test; the threshold of statistical significance was taken when the criterion $p \leq 0.05$ [8].

Results and discussion. Physical development is understood as continuous physiological processes characterized by a complex of morphological and functional properties inherent to the body at any given time and developing under the influence of genetic and environmental factors [9]. Physical development is one of the few indicators that allows us to catch the changes in the health of not only the population as a whole, but also its individual groups (age, sex, ethnic, etc.) [10].

The length of the body, as we know, 25% reflects genetic mechanisms, and less subject to the influence of diet, physical activity and other anthropogenic factors [11].

In assessing the indicators of physical development, it was found that the length, body weight among boys aged 9-10 years is higher compared with girls of the same age (Fig.1.2). However, at the age of 11, the examined girls had a longer increase in length (by 3.3 cm), body weight (by 0.6 kg), which is understandable with an earlier entry into the puberty period compared to peers. Body weight, in contrast to body length, is considered to be labile morphological index. Significant sexual differences in body length among boys revealed in 10 years of age.

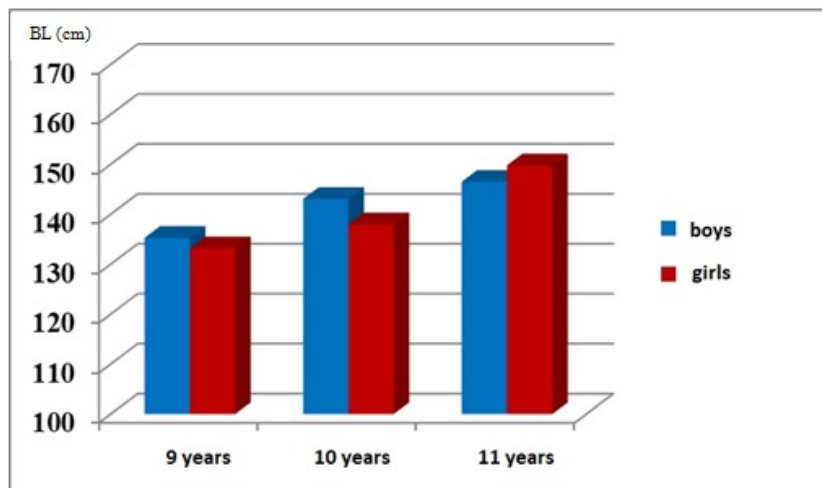


FIGURE 1 – Body Length indicators (cm) of the surveyed children's Note. Significant differences in mean values for nonparametric independent samples: * - depending on sex

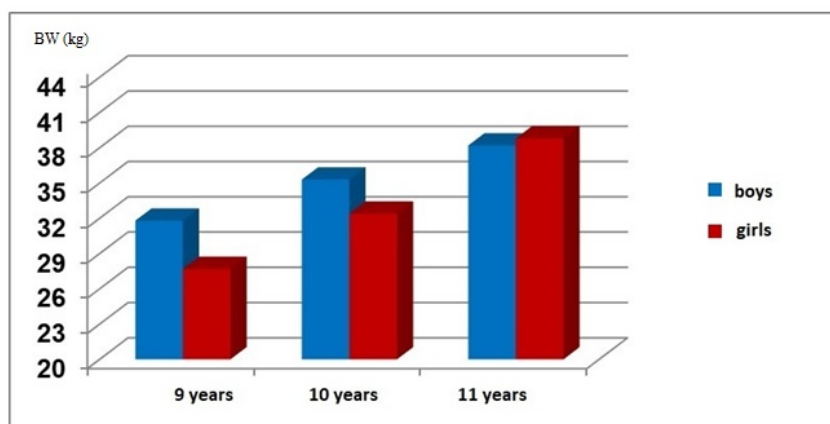


FIGURE 2 – Body Weight (kg) of the surveyed school children

Comparison of chest circumference (Fig.3) revealed differences in the age of 9, boys outperform peers by 4.1 cm. At the age of 10-11 years of reliable sex differences were observed. The increase of all morphological development indicators in ontogenesis was observed both among boys and girls.

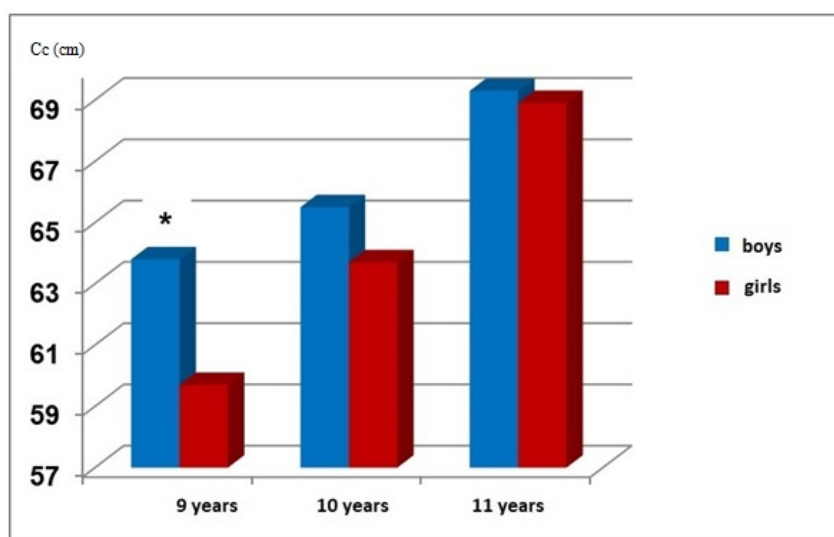


FIGURE 3 – Chest circumference (cm) Of the surveyed school children. Note. Significant differences in mean values for nonparametric independent samples: * - depending on sex

Certain value in the individual assessment of physical development has a method of indicators. The value of the Quetelet index characterizes the obesity of the body and can assist in identifying overweight, in the oriented assessment of somatic type and functionality of the cardio-respiratory system. In our study (table.1) significant differences in the Quetelet index were found among 9-year-old boys and girls, but in 10-11 years didn't not show significant differences.

TABLE 1 – The indexes of Quetelet and stenia among surveyed students, $M \pm m$

Indicators	9 years		10 years		11 years	
	Boys n=20	Girls n=20	Boys n=20	Girls n=20	Boys n=20	Girls n=20
Quetelet index	17,2±0,6	15,5±0,5*	17,2±0,7	16,9±0,5	17,6±0,8	17,2±0,5●
Stenia index	1,08±0,02	1,17±0,03*	1,07±0,03	1,09±0,02	1,03±0,03	1,03±0,02 ●

Note. Significant differences in mean values for nonparametric independent samples: * - depending on sex; ● - depending on the age in relation to 9 years old children's.

The value of the stenia index well reflects the degree of severity of linear or latitudinal growth of the body and allows us to distinguish periodically the coming change in the direction of growth of the child in the process of physical development [12]. As can be seen from table 1, the value of the Quetelet index in ontogenesis increases, and the indices of the stenia index decreases, which indicates an increase in the density of the body and decrease in the severity of dolichomorphia.

Conclusion. Thus, the comparison of morphological indicators of physical development among boys and girls 9-11 years showed an increase in ontogenesis. An increase in the Quetelet index in the compared age of both sexes was revealed, which characterizes the growth processes. Stenia index in ontogenesis decreased in both sexes.

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Павлодар қаласындағы төменгі сынып оқушыларының морфологиялық жағдайы

Аннотация: Өсу агзасындағы физиологиялық процестердің ерекшеліктерін зерттеуге көп көңіл бөлінеді, себебі балалар мен жасөспірімдердің денсаулығын қалыптастыру және қорғау кез-келген мемлекеттің басты міндеті. Осы зерттеудің мақсаты - Павлодар қаласы жағдайында төменгі буын мектеп жасындағы балалардың морфологиялық даму ерекшеліктерін зерттеу болып табылады.

Павлодар қаласында 9-11 жас аралығындағы мектеп оқушыларының (ұлдар мен қыздардың) антропометриялық параметрлері зерттелді. Бойы /дене ұзындығы/ (ДҰ), дене салмағы (ДС), кеуде қуысының аумағының (КҚА) көрсеткіштері зерттелінді, Кетле индексі (ИК) және стени индексі (СИ) есептелінді.

Ұлдар мен қыздардың физикалық дамуындағы айырмашылықтар анықталды. Осылайша, бойы мен дене салмағы көрсеткіштері бойынша 9-10 жас аралығында ұлдар қыздарды басып озады, 11 жастағы қыздар параметрлер көрсеткіші бойынша көп мағына береді, қатарларымен салыстырғанда пубертатты кезеңге өте ерте өтуімен түсіндіріледі. Кетле және стени индексі сияқты көрсеткіштер үшін нақты жыныстық айырмашылықтар тек 9 жаста ғана байқалды.

Осылайша, 9-11 жастағы ұлдар мен қыздардың физикалық дамуын зерттеу антропометриялық көрсеткіштердік онтогенезінде ұлғаюын көрсетті. Өсу процестерін сипаттайтын екі жыныстағы салыстырмалы жастағы Кетле индексінің өсуі анықталды. Онтогенездегі стени индексі екі жыныста да төмендеді.

Түйін сөздер: морфологиялық даму, антропометриялық көрсеткіштер, оқушылардың денсаулығы, физикалық дамуы, дене өлшемдері.

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Морфологическое состояние младших школьников г.Павлодара

Аннотация: Изучению особенностей физиологических процессов протекающих в подрастающем организме уделяется много внимание, так как формирование и защита здоровья детей, подростков является главной задачей любого государства. Цель данного исследования - изучить особенности морфологического развития детей младшего школьного возраста в условиях г. Павлодара.

Было проведено исследование антропометрических параметров школьников (мальчиков и девочек) 9-11 лет г. Павлодара. Были изучены такие показатели как длина тела (ДТ), масса тела (МТ), окружность грудной клетки (ОГК), рассчитали индекс Кетле (ИК) и индекс стени (ИС)

Выявлены отличия в физическом развитии между мальчиками и девочками. Так, по показателям длины, массы тела мальчики превосходят девочек в возрасте 9-10 лет, тогда как в 11-летнем возрасте девочки имеют большие значения по данным параметрам, что объяснимо более ранним вступлением в пубертатный период по сравнению со сверстниками. По таким показателям как индекс Кетле и стени существенные половые различия наблюдалось только в 9-летнем возрасте.

Таким образом, изучение физического развития мальчиков и девочек 9-11 лет показало прирост в онтогенезе антропометрических показателей. Выявлено увеличение индекса Кетле в сравниваемых возрастах обоего пола, что характеризует ростовые процессы. Индекс стени в онтогенезе уменьшался у обоих полов.

Ключевые слова: морфологическое развитие, антропометрические показатели, здоровье школьников, физическое развитие, тотальные размеры тела.

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