

## PHYSICAL DEVELOPMENT FEATURES OF STUDENTS, ENGAGING IN KICKBOXING

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### Abstract

**Topicality.** The research actuality is predefined by the requirement of society in forming of the physically developed young people by facilities of sporting activity and, in particular, kickboxing. **The objective of the study** is to define the level of physical development of students engaging in a kickboxing. **Results of the Work.** Anthropometric indexes of a kickboxing are at high level and testify to trained sportsmen. The index of fatty mass is 14,85 percentage of skeletal muscles – 43,25. The length of kickboxers body of is connected with the circumference of thorax in the state of calmness ( $r = 0,433$ ), circumference of thorax on inhalation (0,539) and by body weight (0,785). Negative correlation of length of body of sportsmen is observed with muscular mass ( $-0,341$ ) and visceral fat ( $-0,17$ ). **Conclusions.** Average grouping indexes of level of students physical development engaging in a kickboxing are in such limits: length of body is 179,55 cm, the mass of body is 71,15 kg, a circumference of thorax in the state of calmness is 93,67 cm, on inhalation is 98,02 cm, on exhalation is 88,64 cm, an excursion of thorax is 9,38 cm. The index of body weight is 21,95 mind. odes, fatty mass – 14,85 %, muscular mass is 43,25, visceral fat – 2,82. The results specify on the high level of trained and development of kickboxer's muscular system.

**Key words:** physical development, body weight, length of body, circumference of thorax, content of fat, kickboxing, students.

**Юлія Хильчук. Особливості фізичного розвитку студентів, які займаються кікбоксингом. Актуальність дослідження** зумовлена потребою суспільства у формуванні фізично розвинутої молоді засобами спортивної діяльності й, зокрема, кікбоксингом. **Мета дослідження** – визначити рівень фізичного розвитку студентів, які займаються кікбоксингом. **Результати роботи.** Антропометричні показники кікбоксингом перебувають на високому рівні та свідчать про тренуваність спортсменів. Показник жирової маси складає 14,85 %, відсоткового вмісту скелетних м'язів – 43,25. Довжина тіла кікбоксерів взаємопов'язана з окружністю грудної клітки в стані спокою ( $r = 0,433$ ), окружність грудної клітки на вдиху (0,539) та масою тіла (0,785). Від'ємна кореляція довжини тіла спортсменів спостерігається з м'язовою масою ( $-0,341$ ) та вісцеральним жиром ( $-0,117$ ). **Висновки.** Середньогрупові показники рівня фізичного розвитку студентів, які займаються кікбоксингом, перебувають у таких межах: довжина тіла – 179,55 см, маси – 71,15 кг, окружність грудної клітки в стані спокою – 93,67 см, на вдиху – 98,02 см, видиху – 88,64 см, екскурсія грудної клітки – 9,38 см. Індекс маси тіла становить 21,95 ум. од, жирова маса – 14,85 %, м'язова маса – 43,25 %, вісцеральний жир – 2,82. Отримані результати вказують на досить високий рівень тренуваності та розвиток м'язової системи кікбоксерів.

**Ключові слова:** фізичний розвиток, маса тіла, довжина тіла, окружність грудної клітки, уміст жиру, кікбоксинг, студенти.

**Юлія Хильчук. Особенности физического развития студентов, занимающихся кикбоксингом. Актуальность исследования** обусловлена потребностью общества в формировании физически развитой молодежи средствами спортивной деятельности и, в частности, кикбоксингом. **Цель исследования** – определить уровень физического развития студентов, занимающихся кикбоксингом. **Результаты работы.** Антропометрические показатели занятой кикбоксингом находятся на высоком уровне, что свидетельствует о тренированности спортсменов. Показатель жировой массы составляет 14,85 %, процентного содержания скелетных мышц – 43,25. Длина тела кикбоксеров взаимосвязана с окружностью грудной клетки в состоянии покоя ( $r = 0,433$ ), окружностью грудной клетки на вдохе (0,539) и массой тела (0,785). Отрицательная корреляция длины тела спортсменов наблюдается с мышечной массой ( $-0,341$ ) и висцеральным жиром ( $-0,117$ ). **Выводы.** Среднегрупповые показатели уровня физического развития студентов, занимающихся кикбоксингом, находятся в следующих пределах: длина тела – 179,55 см, масса тела – 71,15 кг, окружность грудной клетки в состоянии покоя – 93,67 см, на вдохе – 98,02 см, выдохе – 88,64 см, экскурсия грудной клетки – 9,38 см. Индекс массы тела составляют 21,95 усл. ед, жировая масса – 14,85 %, мышечная масса – 43,25 %, висцеральный жир – 2,82. Полученные результаты указывают на достаточно высокий уровень тренированности и развития мышечной системы кикбоксеров.

**Ключевые слова:** физическое развитие, масса тела, длина тела, окружность грудной клетки, содержание жира, кикбоксинг, студенты.

**Introduction.** A health of student's youth is priority direction of development in the system of education. Strengthening and maintenance of student's youth health, increasing of their physical preparedness is one of basic tasks that stand before Ukrainian society [1; 2; 3; 6; 11; 16]. Engaging in a

kickboxing direct to strengthening of health and tempering of sportsman organism, improvement of their physical, moral and volitional and capture motive skills.

A. A. Markosyan with coauthors assert that anatomical and physiological features are one of basic factors, that determine a health level, development and display of physical capabilities [5].

On the example of karate kiokushyn, the influence on effectiveness of sportsman of his proportions (longitudinal sizes, width of shoulders), mass of skeletal musculature, fatty body weight have well-proved [4]. Scientists assert that forming of organism of students is predefined by the indexes of physical development and physical preparedness. Development of anthropometric indexes characterizes a bodily condition and physical capabilities that represent physical preparedness of student [12]. Scientists investigated physical development of students of higher educational institutions, that predefined by the necessity of individualization of physical education of students [7; 9; 10].

A kickboxing is to one of the most difficult types of sport in a technical and tactical relation. A situation on a ring changes quickly, that requires from kickboxer the lightning speed and exact reacting, timely acceptance and realization of decisions. Large intensity of actions envisages development of endurance, force, systematic and economic expense of energy. In later years in our country in kickboxing industry considerable changes took place: the amount of higher digits kickboxers increased, trainers of high qualification, all new and modern sections are opened, and the competitions of international level are conducted. It is therefore important to i of engaging in a kickboxing on physical development of students.

**Research aim** is to define the level of physical development of students, engaging kickboxing.

**Methods and organization of research** are an analysis and generalization of literary sources, anthropometry and methods of mathematical statistics. For the estimation of physical development of students that engage in a kickboxing, the analysis of such indexes was conducted: length and body weight, circumference of thorax in the state of calmness, on inhalation and exhalation, the index of body weight, fatty and muscular mass, content of visceral fat in an organism. Measuring of kickboxers body weight we conducted on the device of Body Composition Monitor OMRON BF510, that gave an opportunity to define exact body of sportsmen weight, index of body weight, fatty and muscular masses, percent of visceral fat.

For creation of scale on determination of composition of body a device takes into account an electric impedor, and also height, weight, age and sex, and gives out the indexes of body composition on the basis of data of OMRON device. The index of body weight settled accounts after formula:

$$IMT = \text{weight (kg)} / \text{height(m)} / \text{height(m)}.$$

A percentage of fat in an organism is a relation of fat weight in an organis to general body weight, shown in percents.

$$\text{Percent content of fat in an organism (\%)} = \{ \text{Mass of fat in the organism (kg)} / \text{body weight (kg)} \} \times 100.$$

Researches were carried out on the base of the Lesya Ukrainka Eastern European National University, 33 students, engaging kickboxing, participated there.

**Research Results. Discussion.** Physical development is a process of change of morphological and functional signs of organism, basis of that are the biological processes, predefined by the inherited genetic factors, terms of environment and education. It depends on the natural life-breaths of organism and its structure. The high level of physical development combines high-performance physical preparation. Physical development is one of indexes of the population health state [1; 3; 10; 12] and depends on the level of motive activity [8; 14; 15; 17]. It is known that a health is determined by not only a presence or by absence of illnesses but also harmonious development, normal level of basic functional indexes [1; 16; 18].

The integral index of physical development is length of body (distance from the overhead point to the plane of feet). In researches of scientists [4; 10] marked, that during all period of studies length of body substantially did not change and was 178,2–179,4 cm. These data testify that the height of body in length practically came to an end at 18 years old. Our researches testify that length bodies of students, engaging in a kickboxing is on the average of 179,55 cm. These indexes are within the limits of age-old norms (table 1).

Table 1

Physical Development of Students that Engage in a Kickboxing

Indexes	$\bar{X}$	S	$S\bar{x}$
1	2	3	4
Length of body, cm	179,55	7,49	1,294

Table 1

1	2	3	4
A circumference of thorax in a calmness, <i>cm</i>	93,67	4,56	0,794
A circumference of thorax on inhalation, <i>cm</i>	98,02	5,33	0,928
A circumference of thorax is on exhalation, <i>cm</i>	88,64	5,0	0,87
Body weight, <i>kg</i>	71,15	7,70	1,341
Index of body weight, <i>kg/m<sup>2</sup></i>	21,95	1,73	0,302
Fatty mass, %	14,85	3,32	0,578
Muscles mass	43,25	2,30	0,400
Visceral fat, <i>mind. odes.</i>	2,82	1,76	0,306

Circumference of thorax – one of the basic anthropometric parameters that characterize the transversal sizes of body. It represents the degree of development of thorax, functional state of the respiratory system, development of muscles of thorax and hypodermic–fatty basis of breasts also. An excursion of thorax is a difference of circumference of thorax between inhalation and exhalation. An excursion is the indirect index of athlete training. It is set that at the years of the intensive training an excursion increases. For sportsmen, especially for swimmers, the excursion of thorax can arrive 10–14 cm, for patients decrease to 2–1 cm and even to the zero. On the average it makes a 5–7 cm. In investigated kickboxers the circumference of thorax in a calmness makes 93,67 cm, on maximal inhalation it is 98,02 cm, to exhalation – 88,64 cm, an excursion is 9,38 cm. These indexes are at high enough level. Excursion in 9,38 cm, testifies for the athleticism and trained of sportsmen, high functional state of the respiratory system and developed muscles of thorax.

Individual body weight is a sum of bones weight, muscles, and internals, liquid and fatty fabric. Water presents 60–65 % of general body weight and is a component that changes quickly, though in small amounts. Quantitative description of body composition, estimation of correlation of fatty, muscular and others components, is the reflection of balance of energy and degree of satisfaction of necessity of organism in energy. The middle index of body weight in kickboxers is 71,15 kg, that substantially does not differ from the conditional average man of corresponding age-old group.

An index of body weight (IMT) is a calculation size that allows approximately to estimate the degree of accordance of person's weight mass of man and its height. According to recommendations of BOO3, if an index below than 16, then it means the expressed weight deficit; 16,5–18,49 is insufficient body weight; 18,5–24,99 is a norm, 25–29,99 is surplus body weight, 30 and higher is obesity. Determination of IMT it is necessary for verification of accordance of height and weight body indexes of sportsmen, and also for the estimation of development of the diseases risk related to surplus or insufficiency of body weight.

An index of body mass for students, that engage in kickboxing is 21,95 *mind. odes.*, that is in norm and specifies on harmonious development of sportsmen.

For the estimation of percentage of fat in an organism a device uses the method of BI. Depending on the place of accumulation of fat in an organism it is divided by visceral (internal) and hypodermic fat. For men in age of 17 the percentage of fat in a norm folds 10,1–24,2 % and in age of 18–39 it presents 8,0–19,9 %. For students, that engage in kickboxing the index of fatty mass folds 14,85 that specifies on normal correlation of percentage of fatty mass in the body of students engaging kickboxing.

It is considered that an increase amount of visceral fat is directly related to the increase of content of fat in the circulatory system, that can result in such general diseases like a hyperlipidemia and diabetes, what does not allow insulin widespread disease to pass energy from a blood stream and use it in cages. In order to avoid widespread diseases or to promote immunity, it is necessary to reduce the amount of visceral fat to the acceptable level.

For the people the norm is a level of visceral fat is in limits from 1 to 9, high level is considered from 10 to 14, and very high from 15 to 30. For students that engage in kickboxing a middle index is 2,82, that is within the limits of norm. It specifies on correct metabolism, proper functioning of internals and systems in organisms.

Muscular component, however no one other morphological index so well characterizes physical possibilities of sportsman. Muscles are divided into two kinds: muscles of internals, for example heart, and muscles connected with bones and necessary for bodies moving. Skeletal muscles can be grown due to physical exercises and other activity. The increase of percentage of skeletal muscles means that an organism can easier spend energy, and, less apt to the accumulation of fat. It facilitates the conduct of active way of life. Measuring results of skeletal muscles percentage for adult men in age from 18 to 39 is 33,3 % – low,

33,3–39,3 % – normal, 39,4–44,0 % high, and from 44,1% is very high. For students that engage in kickboxing a middle index folds 43,25 % and it testifies to the high level of muscular system development, that an organism can easier spend energy for sporting activity and less apt to the accumulation of fat in an organism. Also it specifies on high training level of sportsmen.

For of intercommunications between the indexes of physical development of kickboxers a correlation analysis was conducted. Research results testify that length of kickboxers body connects with the circumference of thorax in the state of calmness( $r = 0,433$ ), circumference of thorax on inhalation (0,539) and body weight (0,785) (table 2).

Negative correlation of sportsmen body length of body is observed with muscular mass ( $- 0,341$ ) and with visceral fat ( $- 0,117$ ). It specifies that than sportsman is higher, thus the index of muscular mass and visceral fat is less in an organism.

Table 2

**Correlation Intercommunications Between Indexes of Kickboxer's Physical Development**

№	2	3	4	5	6	7	8	9
1	0,433	0,539	0,072	0,785	0,109	0,155	-0,341	-0,117
2		0,896	0,855	0,719	0,633	0,681	-0,442	0,495
3			0,611	0,792	0,623	0,640	-0,419	0,526
4				0,389	0,562	0,546	-0,286	0,515
5					0,616	0,548	-0,501	0,330
6						0,744	-0,364	0,695
7							-0,714	0,747
8								-0,442

**Notes.** 1 – length of body, 2 – a circumference of thorax in a calmness, 3 – a circumference of thorax on inhalation, 4 – a circumference of thorax on exhalation, 5 – body weight, 6 – an index of body weight, 7 – fatty mass, 8 – muscular mass, 9 – visceral fat.

Body weight of kickboxers positively correlates with an index of the body mass (0,616) and by fatty mass and negatively with muscular mass ( $- 0,501$ ). The index of body weight positively correlates with the percentage of fatty mass (0,695) and level of visceral fat (0,744).

**Conclusions and Perspectives of Further Researches.** Average grouping indexes of physical development level of students that engage in kickboxing are in such limits: length of body is 179,55 cm, the masses of body is 71,15 kg, a circumference of thorax in the state of calmness is 93,67 cm, on inhalation is 98,02 cm, on exhalation is 88,64 cm, an excursion of thorax is 9,38 cm. The index of body weight is presented of 21,95 mind. odes, fatty mass – 14,8 5% muscular mass – 43,25 %, visceral fat – 2,82. The got results specify on the enough high level of trained and development of the kickboxers muscular system.

In further it is needed to define intercommunication of physical development with the functional state of kickboxers.

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