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**HYGIENIC EVALUATION OF THE RELATIONS BETWEEN
NUTRITIONAL STATUS AND HEALTH OF THE MEDICAL
UNIVERSITY STUDENTS**

Speciality: 3240.01 – Hygiene

Field of science: Medicine

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A B S T R A C T

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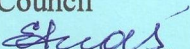
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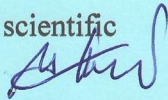
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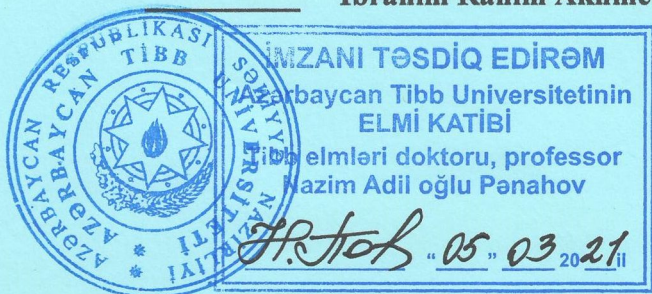
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URGENCY OF A PROBLEM AND THE DEGREE OF ITS STUDY

The educational process in higher schools undergoes to fundamental changes in regard to integration of educational system to international educational process in modern period. By basing on the principle to gain humanism and high knowledge, the modernization of higher education considers the increase of quality of effectiveness of the education's strategy and technology by the way of its changing. The impact of several progressive aspects of this process to the health of adolescents and young students shows itself [Зиматкина, Т.И. и др., 2017; Кучма В. Р. и др., 2007]^{1,2}.

Several authors investigating the issue of the students' health include the students in a group of population under high risk for specification of higher education [Карабинская О.А. и др., 2015; Страхова И. Б., 2015]^{3,4}. It is shown that, the students undergo to the impact of several factors complex threatening the health at the period of study. Here includes constant existing stress character information, labour, violations of relaxation and feeding regimes, heavy educational load, intensity of the pace of life and time shortage in this regard, etc. [Застрожин М.С. и др., 2012]⁵. According to the

¹ Зиматкина, Т.И., Малевич, Р.О., Вольф, С.Б. Медицинское облучение детей и пути его оптимизации // Новости медико-биологических наук, - 2017, № 16 (1), - с. 14-19.

² Кучма, В. Р. Основы рационального питания и гигиеническая оценка пищевого статуса студента / В. Р. Кучма, Е. Г. Блинова, Г. А. Оглезнев, - Омск: Издат. ОмГМА, - 2007, - 172 с.

³ Карабинская, О.А. Гигиеническая оценка фактического питания студентов младших курсов / О.А. Карабинская, В.Г.Изатулин, О.А. Макаров [др.] // Сибирский медицинский журнал, - 2015, №4, - с. 76-79.

⁴ Страхова, И. Б. Рациональное питание как фактор здорового образа жизни студенческой молодежи // Ж. Интерэкспо Гео-Сибирь, - 2015, т. 6, №2, - с. 168-172.

⁵ Застрожин, М.С. Исследование содержания микроэлементов в рационе питания студентов РУДН / М.С.Застрожин, Р.Ю.Еремичев, О.А. Александров [и др.] // Здоровье и образование в XXI веке, - 2012, т.14, №4,- с. 489-490.

authors [Qasimov M.S. və b., 2017; Вржесинская О. А. и др., 2018]^{6,7} who mention the priority position of feeding among those factors, efficient feeding is an important criterion of quality of human life, violation of it character and regime is also reflected in physical development of organism, health and all functional activities.

According to the research conducted in the direction of learning of impact of factors that plays a role in this or other extent in the students' health to organism, the most objective criteria of health evaluation are indicators of physical development and illness. It has been determined that, health disorders in 80-85% of students and serious chronic diseases in 30-35% of students are observed during annually preventive medical examinations. The investigation of relations between feeding status and physical development shows that, the feeding characterized with daily unnecessary repletion causes to formation of unnecessary body mass in 13,5% of examined persons. According to dispensary examinations, it has been determined that, only 76,70% of students-youths have normal physical development [Кобыляцкая И.А. и др., 2015; Солодков А.С., 2013; Фоменко О.И., 2013; Weber E. et al., 2008]^{8,9,10,11}.

According to investigations, high level and physical development violations (deficiency of body mass) of illnesses are followed in 20%

⁶ Qasimov, M.S. Azərbaycan milli mətbəxində pəhriz və əhalinin səmərəli qidalanmasının bəzi məsələləri / M.S. Qasimov, K.A.Qurbanov, A.A. Namazova [və b.] – Bakı: “Nurlar”, - 2017. - 776 s.

⁷ Вржесинская, О. А., Бекетова, Н. А., Коденцова, В. М. Витаминный статус студентов Северного государственного медицинского университета // Профилактическая медицина, - 2018, №21(1), - с. 39-43.

⁸ Кобыляцкая, И.А., Осыкина, А.С., Шкатова, Е.Ю. Состояние здоровья студенческой молодежи // Успехи современного естествознания, - 2015, № 5, - с. 74-75.

⁹ Солодков, А.С. Физическое и функциональное развитие и состояние здоровья школьников и студентов России // Ученые записки унив.та имени П.Ф. Лесгафта, - 2013, № 3, - с.163-171.

¹⁰ Фоменко, О.И. Здоровье студентов медицинского вуза как медико-социальная проблема // Астраханский медицинский журнал, - 2013, т. 8, №1,- с. 284-286.

¹¹ Weber, E., Hiebl, A., Storr, U. Overweight and obesity in children starting school in Augsburg // Dtsch. Arztebl. Int., -2008, v. 105, № 51-52 - p. 883-89.

of students and decrease of physical employment ability in 50% of students [Сахарова О.Б. др., 2011]¹². Investigators [Пешкова Г.П. и др., 2010; Шагина И.Р., 2010]^{13,14} mention that, the learning methodology of health condition is not ripe, they are clinically oriented, little attention is paid to impact of education's organization and living conditions, feeding specifications to the health, also research of physical development features that is considered more objective approach in evaluation of health condition. The several eminent hygienists-scientists [Баранов А.А. и др., 2013; Кучма В.Р., 2014; Онищенко Г.Г., 2015]^{15,16,17}, who note an important theoretical and practical importance of researches in this direction, consider the protection of health of students-youths as important problems of modern hygiene.

The literature information show that, health is not at normal level in the most of higher school students, especially the prevalence of several chronic diseases among students increased. Meanwhile, the health level of students studied in higher educational institutions reflects the social-economic and hygienic progress of the state, also it is considered the important indicator of the development of

¹² Сахарова О.Б. Системный анализ факторов, влияющих на состояние здоровья студентов младших курсов Дальневосточного федерального университета / О.Б.Сахарова, П.Ф.Кичу, А.В.Гришанов [и др.] // Сибирский медицинский журнал (Иркутск), - 2011, т.107, № 8, - с.73-76.

¹³ Пешкова, Г.П. Питание как фактор формирования здоровья студентов / Г.П. Пешкова, В.С.Бердина, С.И. Ворошилин [и др.] // Материалы XIV Всерос. конгр. диетологов инутрициологов с международным. участием, - 2010, - с. 66.

¹⁴ Шагина, И.Р. Медико-социальный анализ влияния учебного процесса на состояние здоровья студентов медицинского ВУЗ: / автореферат диссертации кандидата социологических наук / - Астрахань, 2010. - 24 с.

¹⁵ Баранов, А.А., Альбицкий, В.Ю., Устинова, Н. В. Состояние, проблемы и перспективы организации медико-социальной помощи детям // Российский педиатрический журнал, - 2013, №3, - с. 4-6.

¹⁶ Кучма, В.Р. Модель организации медицинской помощи обучающимся // Российский педиатрический журнал, - 2014, № 6, - с. 40-44.

¹⁷ Онищенко, Г.Г. Актуальные задачи гигиенической науки и практики в сохранении здоровья населения // Гигиена и санитария, - 2015, № 3, - с. 5-9

society, strong economic, intellectual, labor and defense potential of the country and important factor of the society.

Finally, the protection of health of students at the period of professional training constitutes one of the actual problems of hygiene. The importance of this problem for our republic and lack of researches about it in the republic determined the purposes and duties of dissertation.

The goal of the work

Is to study the nutritional properties of Medical University Students, to make a hygienic evaluation of the role of nutrition and other objective factors in the formation of their health, and to develop the scientific basis for appropriate preventive measures.

Research objectives

1. Study of quantitative and qualitative characteristics of students' food ration.
2. Study and hygienic evaluation of the nutritional characteristics of students.
3. Study of students' physical development indicators.
4. Study and analysis of students' learning processes and morbidity indicators.
5. Development of scientific bases of preventive measures aimed at the formation and maintenance of students' health.

Research methods

In the conducted comprehensive studies, a number of modern research methods were applied, including hygienic (determination of indicators of physical development of students), sociological (questionnaire of students), clinical (examination of the visual function of students), epidemiological (study of morbidity among students), calculated, statistical and other

The main provisions of the thesis defended

1. Distinguishing Medical University Students' nutrition based on the quantitative (energy value) and qualitative indicators of their

daily food ration (proteins, fats, carbohydrates, vitamins, macro and micronutrients) and their nutritional regimen.

2. Hygienic essence of the impact of actual nutrition of students on indicators that reflect their physical development.

3. Hygienic features of the students involved in the educational process.

4. Impact of training courses and tendencies related to the gender symbols in actual nutrition of students on their morbidity rates.

Scientific novelty of the thesis

As a result of complex scientific researches, for the first time in the country, the characteristics of the nutrition status of medical university students have been discovered and found that 30-35% of students' nutrition is ineffective and is characterized as unbalanced nutrition status. In this regard, the main findings regarding the nutritional characteristics of students and their health-related tendencies may be attributed to the following scientific innovations:

- the lack of nutrition regimen in the students, the fact that their daily food ration is not properly distributed according to the amount of nutrients or energy content of the day, and their inability to meet the daily needs of the body's energy, essential nutrients, certain vitamins and minerals At the same time, the violation of the rations of the basic nutrients and minerals contained in the ration to the physiological requirements indicates that students' food ration is not fully valuable;

- the complex evaluation approach applied in identification of physical development level of the students enables to get more objective data;

- dependence of relations between the physical development indicators of the students and their actual nutrition on the training courses, as well as different features depending on the training courses in the levels of the correlation relationships between the energy value of the daily food ration and body mass indicators were identified;

- the disadvantageous impacts of the educational process and daily teaching load on the physical health of the students and the systems

ensuring their adaptation functions were identified (straight correlation dependence between the level of adaptation potential and the training courses);

- differences were identified for gender symbol between actual nutrition of the students and their physical development indicators – falling the nutritional indicators of the girls behind boys is reflected in low level of relative indicators characterizing the physical development and in higher levels of their morbidity.

Practical importance of the researches

For the first time in the republic, the actual nutrition of the students of various courses taking into account the gender identity of all faculties of medical university and its relationship to health status has been studied in complex research. The quantities of the main nutrients (proteins, fats, and carbohydrates) and micronutrients (vitamins and minerals) that are included in the daily food ration are determined hygienically, and scientific guidelines have been developed to optimize the nutrient content of the food ration.

Lack of biologically active animal protein and vegetable oils due to chemical composition in daily food ration, extremely low levels of fish and other seafood (4-25% - physiological norm) in students' recurrent morbidity and physical development retardation are considered risk factors for students' physical health and development.

Some of the indicators derived from the calculations and characterizing physical development, including body mass ratio (BMR), allow identifying the risk groups among the students for various diseases. Thus, although the low levels of BMR indicate an increased risk of contracting infectious and gastrointestinal tracts, high rates can predict the likelihood of developing relevant non-communicable diseases by characterizing body mass and body fat levels.

Approbation of the thesis and implementation

The Thesis materials were discussed at the international scientific conference titled "Actual problems of labor hygiene in Kazakhstan: chrysotile and health" (Karaganda, 2018); at the scientific-practical

conference "Actual Problems of Medicine", dedicated to the 100th anniversary of the Azerbaijan Democratic Republic (Baku, 2018); at the scientific-practical conference dedicated to the 95th anniversary of the of Professor T.A.Tagizadeh, at the International Scientific-Practical Conference "Actual Problems of Medicine 2019", dedicated to the 100th anniversary of the establishment of the Faculty of Medicine under Baku State University; at the interdepartmental meeting of the AMU profile chairs jointly (Baku, 2019). Scientific work on the results of the research was awarded the III place in the republican competition announced by the Ministry of Education and the Ministry of Youth and Sports of the Republic of Azerbaijan.

The results of the research are reflected in the methodological recommendations on "Prophylaxis of health risk for the medical university students in relation to nutrition" in addition to being accepted by the Department of Quality Assurance and Innovation at AMU (22.01.2019), as well as it is considered advisable to apply preventive and current sanitary control by the Republican Center for Hygiene and Epidemiology (letter of the Republican HEC, No. 04-22 / 47, 10.01.2019).

SURVEY MATERIALS, VOLUME AND METHODS

The protection of health of higher school students and their education attains an important strategic for each country and therefore it is included in the rank of main duties of the hygienic science. The strict relevance of this matter is explained with important reforms and inclinations in this regard observed in the health of students recently in higher education system, especially in the direction of coordination of educational process in the study of medicine with level of modern requirements. The results of researches conducted in this area show that, the increase of number of subjects in educational-professional programs in medical

niversities causes to increase of total academic load up to 1,5 times [Бархатова Л. В. и др., 2016; Михайлова С.В., 2018]^{18, 19}.

The character of educational activity, becoming of educational material non-adequate difficult in comparison with secondary school program, educational load and its organization, factors in regard to conforming to educational environment, complex risk factors exert unfavorable influence to the health of students. Especially, the first courses of medical education request from student to adapt to new and complex educational process, to form educational, feeding and daily regime, also other social issues and to mobilize high energy loss, physical force and internal potential of organism. As a result, it creates an opportunity for excessive fatigue and development of some diseases [Климов И.А. и др., 2016; Павлов В.И., 2011]^{20, 21}.

By considering those indicated, the investigation of important hygienic problem not learned till the present period in the republic - the formation characteristics of the health of students-youths in the person of students of medical university, factors playing a principal role in this process, also feeding factor and determination of mutual relations with its physical development characteristics constituted a principal subject of the present research.

In accordance with the goals and objectives of the study, the research was carried out in the following areas: a) chronometry and determination of energy losses of students' daily activities across different faculties and courses; b) investigation of students' nutritional characteristics (nutrition regimen, dietary composition of daily ratio, chemical indicators and energy value) (sociological and

¹⁸ Бархатова, Л. В., Наталевич, Л. Заболеваемость студентов вуза Прибайкалья по данным углубленного медицинского осмотра // Педагогические науки, - 2016, т.2, №42, - с. 184-188.

¹⁹ Михайлова, С.В. Комплексная оценка состояния здоровья студенческой молодежи // Профилактика и клиническая медицина, - 2018, № 1 (66), - с. 23-30.

²⁰ Климов, И.А., Мищенко, Н.В. Комплексная оценка физического состояния студентов // Известия Самарского научного центра Российской академии наук, - 2016, т.18, № 1, - с. 17-22.

²¹ Павлов, В.И. Формирование здорового образа жизни студенческой молодежи // Ученые записки ун-та имени П.Ф. Лесгафта, - 2011, № 3(73), - с. 154-158.

computational methods); c) study of the physical development of students, studying the relationship between physical development and nutrition (hygienic methods of examination); d) examination of disease indicators (methods of epidemiological examination) based on the results of survey questionnaire and doctor's inquiries; d) examination of vision function (clinical examination methods); e) study of the characteristics of the training regime; comprehensive study and analysis of the nutrition, physical development, and training modality of those involved in the examination (statistical methods).

Total 1059 students from both sexes were recruited from the Medical University of Azerbaijan (Table 1). The examinations calculated the chemical composition and calorie content of 36-40 items included in the students' daily food ration.

Table 1
Information on number and content of the examined students

Examined students		Boy	Girl	Total	
I. Surveyed – total		184	278	462	
For faculties and courses	treatment prophylaxis	52	79	131	
	dentistry	42	52	94	
	pharmacy	18	23	41	
	public health	I Course	26	57	83
		II Course	24	28	52
V Course		22	39	61	
II. Those seeing the doctor		163	106	269	
III. Those whose vision function examined		119	209	328	
Final		466	593	1059	

For an evaluation of physical development, 10 anthropometric indicators were measured, plus 6 different coefficients were obtained by means of formulas. In addition to examining the individual medical records of students applying to the outpatient clinic to investigate students' illnesses, data on acute (1 or several times a year) and chronic diseases (conducted or existing) were included in the questionnaire. Examination of students' visual function was

conducted among those who did not refuse it or who complained about it (including optical glasses).

A number of methods of sanitation statistics were used in the statistical development of the material. The mean values (M), mean error (m), mean squared deviation (δ), Student's "t" criterion, correlation coefficient (r_{xy}) and its mean error (m_r) were calculated.

STUDY AND HYGIENIC EVALUATION OF QUANTITY AND QUALITY INDICATORS OF STUDENTS NUTRITION

Studies have shown that students' dietary habits do not meet the appropriate hygienic requirements. Here, 68.33-72.32% of students do not have a certain meal time, only 20.0-23.90% use "soup" foods, 65% tend to have more "dry" foods, 35 - Dairy products in the ratio of 37% and 90-95% of the fish products include a small proportion ($41.93 \pm 0.23\%$) of breakfast and so on. Deficiency or excess of energy and biologically active substances required by students' dietary hygiene also plays an important role [Балыкова О. П. и др., 2012; Горева, Е.А. и др., 2015]^{22, 23}.

According to our research, the daily ration consists of meat, milk, eggs, bread, fruits and vegetables and other products. There are some differences in the number of students using these products, depending on the faculty, course, and gender. The general trend is that the number of girls who use these or other foods is often less than the height. For example, the number of pups and females eating eggs in the treatment and prevention faculty was 29.92 ± 1.90 and $23.53 \pm 0.93\%$, respectively, for students ($t = 3.03$; $p < 0.01$). From the 1st to the 5th year, the number of persons who use certain foods excessively is reduced by statistical accuracy.

²² Балыкова, О. П. Исследование культуры питания студентов вузов - одного из факторов формирования здоровья / О. П. Балыкова, А. П. Цыбусов, Д.С. Блинов [и др.] // Журнал Интеграция образования, - 2012, №2 - с. 56-59.

²³ Горева, Е.А., Дюсенбаев, А.С., Туленкова, К.С. Анализ системы питания студенческой молодежи // The Journal of scientific articles "Health and Education Millennium", - 2015. v. 17. № 4, - p. 141-146.

Students' use of various foods is reflected in the provision of organism with certain nutrients (Table 2). Thus, the supply of basic nutrients for girls who received less food than boys was lower,

Table 2

Chemical composition and energy value of foods that students consume in 1 day for different faculties and courses (% by norm)

Food stuff., Students		Faculties			Courses (public health)		
		T/prop.	Stom.	Pharm.	I	II	V
Macronutrients							
Protein	boy	84,36	103,9	111,2	147,7	111,0	104,05
	girl	66,78	93,44	90,65	116,5	76,23	88,72
Fat	boy	132,1	126,2	175,37	221,3	169,23	128,70
	girl	130,8	154,3	155,92	194,5	131,60	131,03
C/h	boy	98,91	112,1	91,87	104,1	89,96	95,79
	girl	78,66	106,7	83,14	91,89	77,32	87,39
Vitamins							
B ₁	boy	59,33	82,0	75,33	122,0	78,0	101,33
	girl	48,0	65,33	53,33	83,33	48,0	64,0
B ₂	boy	51,66	47,22	76,11	72,22	65,55	55,55
	girl	40,55	42,77	48,89	51,11	40,0	50,55
PP	boy	70,40	67,90	98,55	143,1	118,05	92,75
	girl	55,90	75,80	94,20	128,3	78,05	91,30
C	boy	96,23	110,5	115,42	165,2	115,24	157,06
	girl	98,22	97,53	139,54	129,4	94,48	83,29
Minerals							
Ca	boy	47,21	30,11	58,46	76,42	51,49	76,07
	girl	46,21	35,20	45,67	49,68	22,24	32,97
Mg	boy	49,04	69,41	68,32	79,68	66,11	69,32
	girl	42,37	50,78	48,72	57,16	44,60	50,92

regardless of the faculty and education. Dependence of course on the dietary intake of essential nutrients is observed. According to the chemical composition of ratio, the body's supply of certain vitamins

and minerals is insufficient. Thus, the daily ration of students of the Faculty of Treatment and Prophylaxis, Dentistry and Pharmacy is less than the norm of group B and PP, as well as Ca and Mg. This is also due to the low inclusion of a number of essential foods (dairy products, cereals, fish, etc.) into the students' daily menu.

It is known, that the mass ratios of the main nutrients in the ration determine the quality of nutrition. Comparison of the mass ratios of the main nutrients to the existing ratios [MR 2.3.1.2432-08]²⁴ shows that protein: fat: carbohydrate ratio is 1:1.66:4.77 (norm 1:1,25:4.97), and in the ration of girls it is 1:1.93:5.02, which is very high in fat (norm 1:1.10:4.73), and that proteins and carbohydrates differ from their physiological norms by 10-20%, such a distinction is permissible according to modern research. It should be noted that excessive fat in the ration is not only a risk factor for the development of a number of diseases (atherosclerosis, obesity, etc.) [Васильева М.В. и др., 2017]²⁵, but also determines the energy value (EV) of the students' ration. There are no significant differences between the total students' daily energy consumption (EC) and the energy value of the ration (Table 3). These indicators among the follows as much as 14% differences are physiologically tolerable, the energy balance of both boys and girls is balanced across all groups examined.

Table 3
Power consumption of students and power value of the food ration

Students		EC, kcal	EV, kcal	For EC %
For all faculties	boy	2938,90±3,90	2824,50±3,80	96,11
	girl	2117,0±2,70	2182,70±2,70	103,10

²⁴ Нормы физиологических потребностей в энергии и пищевых веществах для различных групп населения Российской Федерации: Методические рекомендации. МР 2.3.1.2432-08 - Москва: Минздрав РФ,- 2008, - 42 с.

²⁵ Васильева, М.В., Либина, И.И., Натарова, А.А. Оценка рационального питания студентов как одна из важнейших составляющих здоровья // Символ науки, - 2017, т. 3, № 4, - с. 134-136.

STUDY AND HYGIENIC EVALUATION OF PHYSICAL DEVELOPMENT FEATURES OF THE STUDENTS

Studies show that there are statistically significant differences in the characteristics of the boy and girl in somatometric (mass, height, chest area, etc.) and some physiometric (body muscles strength, vital lung capacity, etc.), and these differences are explained by physiological features is done. At the same time, the tendency to compute based on the mean values of physical development indicators is considered as a means to objectively assess individual physical development [Лавинский Х.Х. и др., 2012]²⁶. However, even the $M \pm 1\delta$ value, which characterizes the normal level of physical development of the same group of students, does not coincide in various indicators. For example, in the public health faculty, the number of normal girls is $39.28 \pm 2.10\%$, whereas in the same group, those with normal physical growth are $62.50 \pm 3.02\%$. Indicators where normal levels of compression tend to be overlapping are also observed in other groups. Therefore, anthropometric standard method that allows for a more objective and comprehensive evaluation of the actual physical development of students [Кучма В. Р. и др., 2014; Ширко Д.И. и др., 2017; Cole T.J. et al., 2012]^{27, 28, 29} was used.

The essence of the method is to summarize the compression tendencies of various indicators of physical development and obtain the average value of these symptoms. In our studies, we calculated the summarized values of the six indicators (mass, height, chest area,

²⁶ Лавинский Х.Х. и др. Методология статуса питания / Х.Х.Лавинский, Н.Л. Бацукова, В.И. Дорошкевич [и др.] // Terra Medica, -2012, № 1,- с. 58-63.

²⁷ Кучма, В. Р. Оценка полноценности и адекватности питания, коррекция фактического пищевого рациона. Учебно-методическое пособие для студентов педиатрического факультета / В. Р. Кучма, Ж. Ю. Горелова, Н. Л. Ямщикова - Москва: Первый МГМУ им. И. М. Сеченова, - 2014. – 30 с.

²⁸ Ширко, Д.И., Дорошкевич, В.И.,Зенькович, В.В.Гигиеническая оценка уровня здоровья курсантов // Военная Медицина, - 2017, №3 (44), - с. 72-76.

²⁹ Cole, T. J., Lobstein, T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity // Pediatric Obesity, - 2012, v. 7, №4, - p. 284–294.

skin-fat layer thickness, body muscle strength, and vital lung capacity) that characterize the students' physical development. (Table 4) In the result, the physical development of 65-70% of students was medium ($M \pm 1\delta$, normal) and physical development of 15-18% of them was low or high.

Given that 45-50% of students' daily activities are related to mental activity, their visual function is examined. Approximately

Table 4

The level of physical development of students by anthropometric standard method (% of students)

Physical development level, students		Level of indicators			
		For total	For courses		
			I	II	V
Below medium	boy	17,09±0,05	21,79 ±0,39	20,0 ±0,37	16,66 ±0,33
	girl	15,45±0,04	12,50 ±0,26	15,46 ±0,20	22,22 ±0,18
Medium, normal	boy	65,08±0,11	60,89 ±0,49	60,83 ±0,60	68,94 ±0,62
	girl	69,81±0,08	77,60 ±0,45	70,83 ±0,40	56,41 ±0,32
Over medium	boy	17,81±0,05	17,32 ±0,33	19,16 ±0,30	14,39 ±0,29
	girl	14,73±0,03	9,89 ±0,23	13,68 ±0,20	21,36 ±0,23

50% of students have mild myopia symptoms. Moderate myopia and eye pressure are present in 4-7% of students. Both pathologies are more encountered in girls and there is a tendency for these diseases to increase as courses are increased.

STUDY AND HYGIENIC EVALUATION OF EDUCATIONAL PROCESS FEATURES AND INDICATORS OF ILLNESSES OF THE STUDENTS

It was found that there were no significant differences in faculty and gender differences in the students' approach to the organization and evaluation of the learning process (curriculum, teaching regime, hard days of the week in the curriculum, etc.). Respectively 88.19 ± 0.53 ; 90.42 ± 0.99 and $85.36 \pm 2.13\%$ of students for medical and preventive, dental and pharmacy faculties overestimate the current teaching load. 92-94% of the first and second course students of the Faculty of Public Health, about 70% of V course students on courses emphasize the heaviness of lessons, their feeling tiredness, sluggishness, sleeplessness, etc. The fact that there are fewer students who are completing the lessons than those who are in the V course compared to low courses can be considered as the result of their adaptation to the teaching process. Such a possibility coincides with the results of other authors' research [Ковалёва О.А. и др., 2017; Рослякова Е.М. и др., 2017]^{30, 31}.

In our studies, students' adaptation to the learning process was assessed based on the results obtained from the adaptation of the body's adaptive resources. Studies have revealed the effects of the learning process on systems that provide students' adaptive functions (respiratory and cardiovascular systems), which are often statistically significant (Table 5). Thus, for each

³⁰ Ковалёва, О.А. Физическое здоровье как интегральный показатель уровня адаптации организма студентов к образовательному процессу / О.А.Ковалёва, Г.В.Солнцева, А.М.Чуглазова [и др.] // Научное обоснование физического воспитания, спортивной тренировки и подготовки кадров по физической культуре, спорту и туризму. Мат. XV Междун.науч.сессии по итогам НИР за 2016 год, посв. 80-летию ун-та, БГУФК, - Минск: - 30 марта – 17 мая, - 2017, - с. 345-347.

³¹ Рослякова, Е.М., Алипбекова, А.С., Игибаева, А.С. Показатели функционального состояния сердечно-сосудистой системы студентов в условиях адаптации к обучению в вузе в зависимости от вегетативного статуса // Международный журнал прикладных и фундаментальных исследований, - 2017, № 5-2, - с. 252-256.

of the two indicators reflecting the level of adaptive capacity of the body, there is a clear high correlation between the courses and the number of students with normal adaptive resources.

An analysis of students' visits to their doctor for 5 years shows that the total number of students living in dormitories is $6.20 \pm 0.19\%$. The number of girls with infected height was 3.75 ± 0.13 and $2.45 \pm 0.16\%$, respectively ($t = 6.50$; $p < 0.001$). Most patients ($49.44 \pm 0.52\%$) were enrolled in I-II courses, 29.74 ± 0.67 and $20.81 \pm 0.79\%$ for III- IV and V-VI courses, respectively. As can be seen, there is a significant

Table 5
The number of students with normal adaptive resources for different courses (% of total) and correlation between adaptation resources and courses

Indicators and students		I course	II course	V course	$r_{\text{korr.}}$
Life coefficient (LC)	boy	$7,69 \pm 1,05$	$8,33 \pm 1,15$	$18,18 \pm 1,82$	0,96
	girl	$3,12 \pm 0$	$14,28 \pm 1,28$	$33,33 \pm 1,41$	0,97
Cardio resp. coefficient (CRC)	boy	$50,0 \pm 2,52$	$54,17 \pm 2,82$	$63,63 \pm 3,30$	0,98
	girl	$53,12 \pm 2,1$	$60,71 \pm 2,59$	$71,79 \pm 2,06$	0,96

correlation between the training courses and the student referrals to the doctor.

According to the survey, the number of acute diseases occurring several times a year per 100 people is statistically higher than pathologies occurring once a year (Table 6). At the same time, if diseases occurring once a year, irrespective of the course, are significantly greater among boys, then pathologies recurring several times a year dominate in girls of all courses. Repeated illnesses throughout the year are considered as a result of malnutrition as a weakening of the immune system and decreased resistance

Table 6

According to the survey, the prevalence of acute and chronic diseases among students

Courses and students		Acute diseases		Chronic diseases	
		Frequency of repetition in 1 year		Passed	Available
		Once	Several times		
I	boy	91,2 ±1,61	101,7 ±1,70	46,15 ±2,43	3,84 ±0,78
	girl	38,44 ±2,22	123,05 ±3,89	24,56 ±0,85	22,81 ±0,82
II	boy	104,16 ±3,86	137,50 ±4,40	58,33 ±2,93	54,16 ±2,82
	girl	82,14 ±2,99	189,28 ±4,44	96,43 ±3,23	121,43 ±3,61
V	boy	140,91 ±4,81	136,36 ±4,74	40,91 ±2,67	81,79 ±3,72
	girl	105,12 ±2,48	189,74 ±3,28	23,07 ±1,19	61,54 ±1,91

[Дорошевич В. И. и др., 2013; Новичихина Е. В. и др., 2016]^{32, 33}.

The levels of chronic illnesses that students have had in the past and are present are different in boys and girls of different courses. The general tendency is that as students' progress to higher courses, the number of students with chronic illnesses increases.

³² Дорошевич, В. И., Ширко, Д. И. Статус питания и состояние здоровья молодых мужчин // Здоровье – основа человеческого потенциала: проблемы и пути их решения, - 2013, № 1, т. 8, - с. 372-373.

³³ Новичихина, Е. В., Ульянова, Н.А. Анализ динамики заболеваний костномышечной системы и соединительной ткани среди студентов Алтайского государственного университета // Научно- периодический журнал Здоровье человека, теория и методика физической культуры и спорта, - 2016, № 2, - с. 78-82.

SPECIFICATIONS AND HYGIENIC EVALUATION OF THE RELATIONS BETWEEN NUTRITION AND HEALTH INDICATORS OF THE STUDENTS (discussion of material)

Nutrition status of organism formed under impact of factual nutrition [Детков В.Ю. и др., 2013; Лавинский Х.Х. и др., 2016]^{34, 35} is evaluated in according to adequacy of nutrition, also indicators characterizing the physical development of organism and activity of functional systems. The mass and skin-fat layer that is more sensitive to the effects of nutrition and is subject to sufficient changes is the most objective criteria of conformity of energetic and biological value of ration to the need of organism [Лебедева С.Н. и др., 2018; Ширко Д.И. и др., 2017]^{36, 37}. In accordance with those criterions, investigation of the relations between physical development and nutrition of the students determined statistic correct differences among the same named indicators (for example: mass, skin-fat layer) of physical development of boys and girls not depending on the faculty and course (Table 7). These differences are considered physiologically acceptable as gender characteristics between boys and girls.

As it seems from this information, low quantity of some foods and the related main nutrients constitute parallelism with falling behind girls' nutrition than boys' nutrition on some aspects (the quantity of separate foods and macronutrients in the ration, energy value of

³⁴ Детков, В.Ю., Скальный А.В. Содержание химических элементов в волосах детей, проживающих в Санкт-Петербурге // Вестник российской военно – медицинской академии, - 2013, № 4(44), - с. 155-158.

³⁵ Лавинский Х.Х., Борисевич Я.Н. Экспресс-оценка статуса питания спортсменов игровых видов спорта (футболистов) // Сб. научных трудов Белорусского государственного медицинского университета “БГМУ в авангарде медицинской науки и практики” - Минск: - 2016, - с. 179-183.

³⁶ Лебедева, С. Н. Оценка рациона питания и антиоксидантной активности биологических жидкостей организма студентов / С. Н. Лебедева, С. Д. Жамсаранова, С.А.Чукаев [и др.] // Вопросы питания, - 2018, т.87, №1, - с. 35-43.

³⁷ Ширко, Д.И., Дорошевич, В.И., Зенькович, В.В. Гигиеническая оценка уровня здоровья курсантов // Военная Медицина, - 2017, №3 (44), - с. 72-76.

Table 7

Daily energy consumption of students (EC), energy value of ration (EV), indicators of physical development and correlation relations among them

Faculties and courses	Students	Energy indicators (% for norm)		Indicators of physical development		Correlation indicators		
		EC, kcal	EV, kcal	mass, kg	skin-fat layer, mm	r	t	
Treatment-prophylactics	boy	121,80	110,58	68,32	14,94	0,41	3,73	
	girl	102,88	116,93	53,60	8,44	0,59	5,36	
Stomatology	boy	115,66	114,39	69,34	17,96	0,58	4,46	
	girl	99,55	117,86	51,76	10,30	0,27	2,25	
Pharmacology	boy	121,22	116,0	70,78	9,33	0,53	3,12	
	girl	106,75	107,12	52,83	6,38	0,73	8,11	
Public health	I	boy	113,48	145,80	68,34	8,38	0,47	3,13
		girl	123,15	125,45	57,78	4,88	0,89	44,5
	II	boy	121,11	115,99	70,0	11,43	0,61	5,08
		girl	114,40	98,47	55,32	6,12	0,74	9,25
	V	boy	116,98	112,83	70,86	15,45	0,91	22,8
		girl	114,33	114,06	54,20	10,71	0,79	9,88

ration, etc.). This parallelism was reflected in the correlation relations of body mass of students and food ration's energy value.

The analysis of relations between students' nutrition and physical development according to the body's mass coefficient (BMC) determined that, normal nutrition that is able to create minimum risk for health ($BMC=18.5-24.9 \text{ kg/m}^2$) covers 67-81% of boys and 63-80% of girls. Moreover, it shall be noted that, more distinct results having hygienic essence are getting in other gradation of BMC. So, low body mass related to energy shortage is 3.85-11.11% among boys, but 20.0-36.36% among girls. According to it, though the number of boys having surplus body mass (surplus nutrition) is 15.38-22.22%

on different faculties, this gradation is not determined among girls. It is evaluated as a result of low efficiency of girls' nutrition in comparison with boys.

The similar condition was observed in indicators of skin-fat layer of students. So, the thickness of skin-fat layer of total boys and girls on all faculties was accordingly 12.08 ± 0.28 and 9.14 ± 0.19 mm ($p < 0,01$). The conforming statistic correct differences are observing in the thickness of especially proteins and carbohydrates) in daily food ration of girls in comparison with boys is accompanying with falling of indicators characterizing their physical development level.

So, the results of researches conducted in the direction of learning of actual nutrition of students, anthropometric indicators, functional and adaptation opportunities of organism, also disease status gives opportunity for complex evaluation of their health status and creates condition for processing of scientific grounds of proper prophylactic measures.

Results

1. Proteins and carbohydrates was within the physical norm in the ration of boys, but these substances was in the low level of physiological need of organism in the ration of girls and 15-25% less than it in the background of about 1,5-2 times more fat from energetic nutrients from the norm and in this regard, sufficiently distinguishing of mass comparison from existing norms in the ration of the main nutrients in the food ration of students attracted to examination on all faculties, therefore their daily factual nutrition was not balanced, it is characterized as specific food deficiency form of non-sufficient nutrition for the reason of deficit of some vitamins (B_1, B_2, PP) and mineral substances (Ca, Mg) in the ration [6, 11, 13].

2. The students' nutrition doesn't meet hygienic principles of optimal nutrition for the reason of incorrectness of nutrition regime of a large number of students (low daily nutrition frequency, lack of definite, well-timed food intake, preference for dry foods in the ration, incorrect distribution of daily food share, etc.) [2, 4].

3. Complex evaluation of the levels of physical development of students depending on factual nutrition by using of several important somatometric and physiometric indicators of organism determined that, physical development of 65-70% of all students (boys and girls) examined on different faculties was within the medium level, 15-17% of them was down the middle and 15-18% of them was high the middle. There is middle level straight correlation relations ($r=0,41-0,59$) between body mass and energy value indicators of daily food ration of I-II course students of different faculties and strong straight correlation relations ($r=0.79-0.91$) between those indicators of upper course students [1, 3, 6].

4. Important relations between nutrition and physical development of students for gender symbol and training courses were determined. The shortage of several food products and nutrients, which assume biological and energetic importance related to it, in the food ration of girls compared to boys causes to falling behind of their many important anthropometric indicators (mass-height and skin-fat layer thickness) at the statistical significance level. The falling behind girls' physical development indicators than boys' physical development indicators in relation to the nutrition is also recorded in the relevant data of I, II and V course students examined [5, 9].

5. 85-92% of respondents totally on various faculties, 92-94% on the upper courses, up to 70% on the lower courses emphasize the heaviness of lessons, their feeling bad at the end of the school day (mental and physical fatigue, sluggishness and sleepiness, working capacity reduction, headache and loss of appetite) and therefore they stress the importance of easing the current teaching load [8, 12].

6. According to data received from examination of the physical condition and adaptation reserves calculated on the basis of a number of demographic, somatometric (chronological age, body mass, height) and physiometric (vital lung capacity, pulse rate, systolic and diastolic pressure) indicators of physical development of students, the current teaching regime, which is generally distinguished by statistical accuracy, has an adverse impact on students' physical health and systems that provide the adaptation functions. The high level of adaptation potential of students studying in the upper courses

compared to the lower courses (I, II) in terms of the statistical accuracy coincides with relations to the current teaching regime of different course students [8, 12].

7. Students who apply to the polyclinic for health reasons constitute 6,20% of persons who live in a hostel. The main part of them consists of students with the acute respiratory disease of the upper respiration tracts and oral cavity diseases who study at the I-II courses ($49.44 \pm 0.52\%$), boys for the gender symbol (boys – 53.70-64.66%; girls 35,34-46,43%). According to the questionnaire survey, there is a direct dependence between persons being ill again once a year with this or other acute pathology and persons with chronic diseases and teaching regime [7].

8. Their relations between actual nutrition and health status (physical development and morbidity indicators) on all faculties of the Medical University and in light of the gender symbol of different course students were determined as a result of complex researches, quantities of the main nutrients (proteins, fats, carbohydrates) and micronutrients (vitamin and mineral substances) entering into the organism through the daily food ration were defined and evaluated hygienically, the scientific basis of proposals have been developed to optimize the nutrient content of the food ration pursuant to the physiological requirement of the organism and they reflected in the relevant methodical recommendations [10].

The organization and conduct of hygienic (measuring somatometric and physiometric indicators of students), sociological (conducting a survey among students), epidemiological (studying the morbidity of students), clinical and ophthalmological (studying the visual function of students) studies and statistical processing of the material obtained are carried out personally by the author. In organizing the study, choosing methods, as well as in questions of analysis, interpretation and editing of the material, the advice and advice of the supervisor, scientific consultant and head of the department were used, for which the author expresses his sincere gratitude.

The list of scientific works published concerning the thesis

1. Kazımova, V.M. Tibb universiteti tələbələrinin sutkaliq enerji balansı və bədən kütləsi arasındakı əlaqələrin tədqiqi // V.Y. Axundov adına Milli ET TPI-nun elmi əsərləri, - 2017, X cild, - s.182-187.
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