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MEDICAL STUDENTS' HYGIENE TRAINING ON HEALTHY EATING AS PART OF CLASSES AT THE DEPARTMENT OF HYGIENE

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Maintaining health and commitment to a healthy lifestyle among students is the basis for their further professional activities, which is true not only for future physicians. The medical students' hygiene education is especially important during their university studies, since it is an element of the future physician personality formation. The study was aimed to substantiate the technology for the medical students' hygiene training provided as part of their classes at the Department of Hygiene. Hygiene training was performed in the group of 173 students of the General Medicine and Pediatric Faculties (index group) as part of the classes on hygiene at the Department of Hygiene, Pediatric Faculty, Pirogov Russian National Research Medical University, for one semester. The equivalent comparison group formed by the copy pair method also comprised 173 medical students of the General Medicine and Pediatric Faculties. Questioning and monitoring of the medical students' progress were used to assess the hygiene training efficiency. The data were processed with the Statistica 13 PL software package. It was shown that the General Medicine and Pediatric Faculty students' hygiene training, that involved the use of checklists and visual materials, provided as part of hygiene classes, was possible. During the classes at the Department of Hygiene 95.0% of medical students in the index group noted they had started to follow the recommendations from the checklist, while no students having 1–2 meals a day were found; the students' motivation to study hygiene as a subject improved, which was reflected in their end of semester grade that was ($M \pm m$) 86.6 ± 0.6 points on average in the index group and 80.6 ± 0.7 points on average in the comparison group ($p \leq 0.05$). Hygiene training of medical students provided during practical hygiene classes proved its effectiveness. The results of the test use of checklists during the semester were positive.

Keywords: hygienic education, students, classes at the Department of Hygiene, checklists, healthy eating

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ГИГИЕНИЧЕСКОЕ ВОСПИТАНИЕ СТУДЕНТОВ-МЕДИКОВ ПО ВОПРОСАМ ЗДОРОВОГО ПИТАНИЯ В РАМКАХ ЗАНЯТИЙ НА КАФЕДРЕ ГИГИЕНЫ

О. Ю. Милушкина, Н. А. Скоблина, С. В. Маркелова, Е. А. Дубровина, О. В. Иевлева ✉

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Сохранение здоровья и приверженности здоровому образу жизни (ЗОЖ) в студенческой среде является фундаментом последующей профессиональной деятельности и не только для будущих врачей. Особенно велика роль гигиенического воспитания студентов-медиков на этапе их обучения в университете как элемент формирования личности будущего врача. Целью работы является обоснование технологии гигиенического воспитания студентов-медиков в рамках занятий на кафедре гигиены. Гигиеническое воспитание проводилось в группе из 173 студентов лечебного и педиатрического факультетов (основная группа) в рамках занятий по гигиене на кафедре гигиены ПФ РНИМУ им. Н. И. Пирогова в течение одного семестра. Равнозначная группа для сравнения формировалась методом «копия-пара», включала также 173 студента-медика лечебного и педиатрического факультетов. Для оценки эффективности гигиенического воспитания использовались анкетирование и контроль успеваемости студентов-медиков. Для обработки данных применен пакет статистических программ Statistica 13 PL. Показано, что в рамках занятий по гигиене возможно осуществление гигиенического воспитания студентов лечебного и педиатрического факультетов с помощью чек-листов и наглядных материалов. В ходе занятий на кафедре гигиены 95,0% студентов-медиков основной группы отметили, что стали придерживаться рекомендаций, сформированных в чек-листе; студенты, принимающие пищу 1–2 раза в день, выявлены не были; повысилась мотивация к изучению предмета «гигиена», что проявилось в семестровом рейтинге по предмету, который составил в среднем ($M \pm m$) $86,6 \pm 0,6$ баллов в основной группе и $80,6 \pm 0,7$ баллов в группе сравнения ($p \leq 0,05$). Гигиеническое воспитание студентов-медиков, осуществляемое на практических занятиях по гигиене, показало свою эффективность. Апробированный прием использования чек-листов в динамике семестра продемонстрировал наличие положительных результатов.

Ключевые слова: гигиеническое воспитание, студенты, занятия на кафедре гигиены, чек-листы, здоровое питание

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The data on the growing number of overweight students are provided in scientific literature [1–3].

At the same time, literature data suggests that the students' understanding of healthy lifestyle is on a tabloid level and is mainly associated with no bad habits. Many students do not consider the fact that a balanced diet, sufficient physical activity, the ability to handle stress, and the ability to properly organize free time are also essential [4–11].

The importance of maintaining health and commitment to a healthy lifestyle among students is the basis for their further professional activities and beyond [12, 13].

The medical students' hygiene training is especially important during their university studies, since it is an element of the future physician personality formation.

Aim: to substantiate the technology for the medical students' hygiene training provided as part of the classes at the Department of Hygiene.

METHODS

Hygiene training was performed in the group of 173 students of the General Medicine and Pediatric Faculties (index group) as part of the classes on hygiene at the Department of Hygiene, Pediatric Faculty, Pirogov Russian National Research Medical University, for one semester. The equivalent comparison group formed by the copy pair method comprised 173 medical students of the General Medicine and Pediatric Faculties, who received no hygiene training. The size of each age-gender group exceeded 100 observations, which, according to the method by K. A. Otdelnova, ensured 95.0% reliability of the study results. The questionnaires developed by the teachers of the Department and monitoring of the medical students' progress were used to assess the efficiency of the provided hygiene training. The questionnaires included questions about the students' commitment to a healthy lifestyle, their self-management in terms of upholding the principles of healthy lifestyle, and implementation of measures aimed at maintaining a healthy lifestyle, etc. [14].

Inclusion criteria for the index group: medical student at the General Medicine or Pediatric Faculty of the Pirogov Russian National Research Medical University, availability of the submitted informed consent, availability of the correctly filled questionnaire. Exclusion criteria: a different group, no informed consent, no correctly filled questionnaire, chronic disorders allowing to assign the student to the health group 4 or 5.

The study did not endanger the subjects, it was consistent with the principles of biomedical ethics and the Declaration of Helsinki; the study involved obtaining the informed consent.

The Statistica 13 PL software package (StatSoft, USA) was used to process the data obtained. The database "Assessment of the Hygiene Training Program Impact on the Awareness of the Non-Compliance with the Basics of Healthy Lifestyle Risk Factors and Safe Use of Electronic Devices, and on the Formation of Skills for the Electronic Device Safe Use in Students of the Secondary and Higher Medical Educational Institutions" № 2021621538 of 16 July 2021 was created based on the findings.

RESULTS

Currently, training of medical personnel is regulated by the Federal State Educational Standard of Higher Education issued in 2020. The standard provides for formation of universal competences (UC) and common professional competences (CPC) in the fields of General Medicine (31.05.01) and Pediatrics (31.05.02) in medical students:

- UC-7 "self-management and self-development (health preservation)";
- UC-8 "to ensure and maintain safe living conditions in both everyday life and professional life...";
- CPC-2 "to control the efficiency of measures for prevention, promotion of healthy lifestyles and health education of the population";
- CPC-10 "to perform standard professional tasks using information technologies, ... information and communication technologies, taking into account the main information security requirements".

During the survey conducted at the beginning of the course, students of both groups noted that the main health preservation strategies they used in their life were as follows: "live communication with friends and loved ones" (68.0%), compliance with the work and rest regime (49.0%); however, 14.0% of medical students did nothing to preserve their health (Fig. 1). Only 16.0% of medical students considered the balanced diet as preventive factor and stuck to it in order to maintain their health. When assessing meal frequency, 49.2% of medical students said they had meals three times a day, 27.0% reported they had four or more meals a day, 22.0% eat twice a day, while 1.8% eat once a day.

A series of checklists on the balanced diet, motor activity, etc., was developed for hygiene training of medical students provided as part of their hygiene classes at the Department of Hygiene. Thus, the balanced diet checklist included the following recommendations:

- remember that food is required to ensure the body's energy supply; do not use food to escape from or relieve negative emotions (comfort eating).

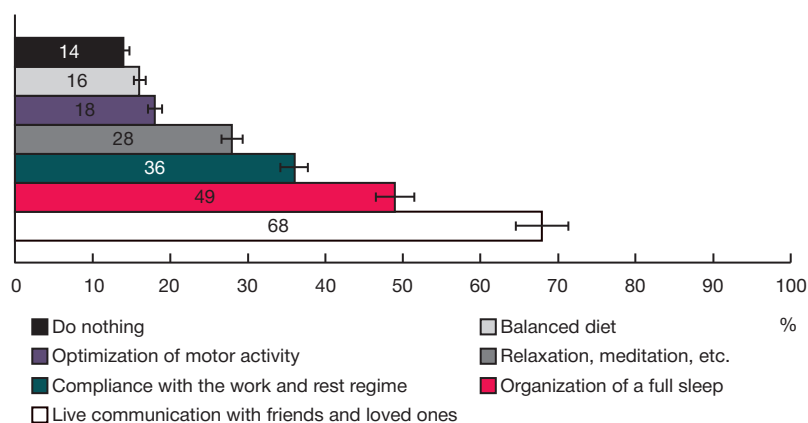


Fig. 1. Popularity of various health preservation strategies used by medical students, %



Fig. 2. Examples of posters "4 Principles of Balanced Diet"

- to fight the habit of comfort eating, it is better to "drink a glass of water" every time you feel tense.
- both clear daily routine and eating pattern (particularly, the number of meals) are essential for proper digestion.
- late supper imposes a heavy burden upon both the stomach and the whole body.
- do not use electronic devices when eating. Don't forget that food should not be consumed along with information.

Posters, that had been created by the Design for School educational space design studio supported by the Center for Hygienic Education of the Population of Rospotrebnadzor and staff of the Department of Hygiene of the Pirogov Russian National Research Medical University, were used as visual materials on healthy eating (Fig. 2). The posters were hung in the classrooms of the Department.

Following the classes at the Department of Hygiene, 95.0% of medical students in the index group noted that they had started to follow the recommendations from the checklist, while no students showing insufficient meal frequency (1–2 times a day) were found. In the comparison group this indicator did not change compared to baseline.

During the index group medical students' training at the Department of Hygiene, their motivation to study hygiene as a subject improved, which was reflected in their end of semester grade that was ($M \pm m$) 86.6 ± 0.6 points on average in the index group and 80.6 ± 0.7 points on average in the comparison group ($p \leq 0.05$).

DISCUSSION

Teaching future physicians the principles of healthy lifestyle is a priority, as evidenced by the literature data on the decrease in the number of students maintaining healthy lifestyle by the date of graduation [15–19].

During their university studies, medical students experience significant intellectual and emotional strain, which results in disturbance of their daily routine and eating, reduced sleep duration and decreased motor activity. The total effect of these factors results in stress, overexertion, reduced body's adaptive capacity, which is a premise for the development of functional impairment and eventually leads to disorders. That is why providing a clear justification for the medical students' hygiene training priority areas is

an important milestone of preventive work, along with the students' motivation to adhere to the health preservation principles, improvement of their awareness of these issues, creation of prerequisites for implementation of health preserving approach during training and in their future professional activities [20–23].

However, the literature describes not many methods of the medical students' hygiene training that facilitate the development of health preservation skills.

Professors of medical universities are mostly responsible for the students' commitment to the principles of healthy lifestyle. This fact may possibly make it necessary to actively search for new forms, methods and teaching aids, together with the personal example of the professor [24, 25].

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CONCLUSIONS

Thus, the study shows that the General Medicine and Pediatric Faculty students' hygiene training on the issues of managing healthy eating, that involves the use of checklists and visual materials, provided within the framework of hygiene classes, is possible. During the index group medical students' training at the Department of Hygiene, their motivation to study hygiene as a subject improved, which was reflected in their end of semester grade.

Hygiene training of medical students provided during practical hygiene classes proved its effectiveness. The results of the test use of checklists during the semester were positive.

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DYNAMICS OF TEACHERS' AWARENESS ON THE ISSUES OF PROTECTING THE HEALTH OF SCHOOLCHILDREN DURING THE ONGOING SANITARY AND EDUCATIONAL WORK DURING 2000–2021

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The issue of students' health promotion is prioritized against the background of preserved high incidence of school-associated nosologies, occurrence of new risk factors that determine a change in the daily schedule and lifestyle, and intensification of an educational process. The implemented system of hygienic control over the valid risk factors is deprived of effectiveness due to its irrational use associated with insignificant motivation of educational process participants for its practical implementation. The purpose of this research is to examine awareness of the teachers during 20-year-long observation of dynamics while obtaining hygienic education on the issues of schoolchildren health protection. 36 and 50 teachers were included into the research in 2000 and 2021, respectively. Inclusion criteria were as follows: gymnasium teacher, time interval, properly completed questionnaire, availability of voluntary informed consent. Exclusion criteria included another professional group and place of employment, another time interval, lack of properly completed questionnaire, no voluntary informed consent. The gymnasium teachers were questioned during a dynamic study and obtained hygienic education on the issue of schoolchildren health protection. Statistica 13 PL pack was used. An increased level of teachers' awareness during sanitary and educational work, formation of healthy lifestyle skills and reduction of a number of teachers (from 33.3% in 2000 to 10.2% in 2021) not promoting their health were noted. This results in improved effectiveness of preventive activities at educational institutions.

Keywords: schoolchildren, teachers, health care, prevention of visual impairment, awareness, questioning, hygienic education

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Compliance with ethical standards: the study was approved by the Ethics Committee of Pirogov Russian National Research University (protocol No. 159 as of November 21, 2016). Every participant provided a voluntary informed consent. In 2021, adults were questioned online on the voluntary basis. The study corresponded to requirements of biomedical ethics and posed no risk to its participants.

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ДИНАМИКА ИНФОРМИРОВАННОСТИ УЧИТЕЛЕЙ ПО ВОПРОСАМ ОХРАНЫ ЗДОРОВЬЯ ШКОЛЬНИКОВ В ХОДЕ ПРОВОДИМОЙ САНИТАРНО-ПРОСВЕТИТЕЛЬСКОЙ РАБОТЫ НА ПРОТЯЖЕНИИ 2000–2021 ГГ.

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Проблема укрепления здоровья обучающихся является приоритетной на фоне сохранения высокого уровня заболеваемости школьнообусловленными нозологиями, появления новых факторов риска, определяющих изменение режима дня и образа жизни, интенсификацию образовательного процесса. Внедренная система гигиенического контроля за действующими факторами риска теряет свою эффективность в результате нерационального ее применения, связанного с недостаточной мотивацией участников образовательного процесса к ее внедрению в практику. Цель исследования — изучение уровня информированности учителей в динамике 20 лет наблюдения в ходе их гигиенического воспитания по вопросам охраны здоровья школьников. В исследовании приняли участие 36 учителей в 2000 г., 50 учителей в 2021 г. Критерии включения: учитель, работающий в гимназии, временной интервал, корректно заполненный опросник, наличие добровольного информированного согласия. Критерии исключения: другая профессиональная группа и место работы, другой временной интервал, отсутствие корректно заполненного опросника, отсутствие добровольного информированного согласия. Проведено анкетирование учителей гимназии в динамике исследования, их гигиеническое воспитание по вопросам охраны здоровья школьников. Использован пакет статистических программ Statistica 13 PL. Отмечены повышение уровня информированности педагогов в ходе проведения санитарно-просветительской работы, формирование навыков ведения здорового образа жизни, сокращение числа учителей (с 33,3% в 2000 г. до 10,2% в 2021 г.), не укрепляющих свое здоровье. Использование данного направления позволяет повысить эффективность профилактических мероприятий в образовательных организациях.

Ключевые слова: школьники, учителя, охрана здоровья, охрана зрения, информированность, анкетирование, гигиеническое воспитание

Вклад авторов: все авторы сделали эквивалентный вклад в подготовку публикации.

Соблюдение этических стандартов: данное исследование было одобрено ЛЭК РНИМУ им. Н. И. Пирогова (Протокол № 159 от 21.11.2016). Добровольное информированное согласие было получено для каждого участника. Проведение онлайн-опроса взрослого населения в 2021 г. проводилось на добровольной основе с использованием онлайн-сервиса. Исследование соответствовало требованиям биомедицинской этики и не подвергало опасности участников.

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Educational process involves obtaining information by students. It mainly arrives via the organ of vision and creates high visual load due to a higher intensity of the educational process and use of modern information and communication technologies resulting in visual impairment even in junior schoolchildren [1–3].

Long-term static stress causes disorders of the locomotor apparatus, blood supply of organs and tissues in a growing body. It also leads to cognitive and psychological fatigue reducing the working capacity of the student [4–7].

Hygienists developed and implemented in practice measures of prevention of school-associated disorders, carried out control over conditions of education, organization of educational process, pattern and type of nutrition, motor activity of students, etc. [8–17]. At the same time, morbidity of students is still high and requires additional measures of prevention [18–23].

One of the ways to enhance effectiveness of health-saving activity within an educational institution is represented by sanitary and educational work of a pedagogical team as to leading a healthy lifestyle, creating conditions at an educational institution to implement health-saving principles and formation of motivation for this activity [24–26].

Purpose of this research is to examine awareness of the teachers during 20-year-long observation of dynamics while obtaining hygienic education on the issues of schoolchildren health protection.

MATERIALS AND METHODS

The research was done in dynamics on the basis of Dolgoprudny Gymnasium (previously known as Gymnasium No. 12) in 2000–2021. In 2000, 36 teachers were interviewed. For 20 years the teachers have been provided hygienic education regarding health protection of schoolchildren as part of the functioning of the testing site on the basis of the Gymnasium. In 2021, 50 gymnasium teachers had an online questioning; 36 of them were interviewed using an adapted standardized questionnaire.

The conducted research posed no danger to its participants, corresponded to the requirements of biomedical ethics and provisions of the Declaration of Helsinki and required voluntary informed consent. Inclusion criteria were as follows: a teacher working at the Gymnasium, time interval of the examination, correctly completed questionnaire, availability of voluntary informed consent. Exclusion criteria included another professional group and place of employment, another time interval of the examination, lack of correctly completed questionnaire, no voluntary informed consent. The conducted research was approved by the Ethics Committee of Pirogov Russian National Research University (protocol No. 159 as of November 21, 2016). The obtained data were processed using Statistica 13 PL (StatSoft, USA) with the significance level of $p \leq 0,05$. One sample Kolmogorov-Smirnov test was utilized to estimate a normal distribution of parameters.

RESULTS

Adequate estimation of schoolchildren health preservation by teachers, their high awareness on a set of measures that enhance health of schoolchildren, regular assessment and correction of teachers' knowledge about the factors influencing health of children and adolescents and measures preventing health disorder are essential for effectiveness of schoolchildren health prevention and protection programs.

In 2000, only 5.6% of the Gymnasium teachers subjectively assessed health of students as 'bad' [27], whereas in 2021, the assessments increased sixfold (32.5%, $p \leq 0.05$).

The questioning held in 2000 showed that the teachers had not enough knowledge of hygienic rationality of teaching and educational activity organization. For 5-day academic week, awareness of academic limit load was displayed by every 9th (11.1%) teacher of first classes and every 6th (16.7%) teacher of fifth-ninth classes only.

The teachers didn't take into account physiological curves of weekly and daily working capacity of students, necessity to switch from one activity to others during lessons, and alternating working postures. Though insignificant motor activity was related to the most significant unfavorable factor influencing health of students, only one-third of teachers (27.8%) paid attention to improved effectiveness of physical culture lessons and use of minor forms of physical activity during an academic day as principal forms of improving motor activities among students. More than a half (77.8%) of these teachers failed to find signs of fatigue in students, every fifth (22.2%) teacher was not aware of the principles that prevent fatigue among students [27].

In 2021, the majority (90.0%) of teachers demonstrated their awareness on these issues.

The year of 2000 was marked by a low level of awareness of vision disorders among the Gymnasium teachers and measures of their prevention. Only every fourth (27.8%) teacher indicated that insufficient level of workplace illumination belonged to the factor of vision disturbance; only one third (38.9%) of teachers were aware of seating arrangement principles of students with vision disturbances [27].

In 2021, the majority (84.8%) of teachers arranged rest breaks while working with electronic devices, and every second (46.9%) teacher made a rest break in accordance with hygienic principles of vision protection (for 1 hour every 30 minutes). While working with electronic devices in a dark premise, the majority (87.1%) of teachers estimated the potential danger of low illumination for vision and limited screen time. Every fifth (8.8%) teacher refrained from work which was consistent with hygienic principles of vision protection. 79.5% teachers used gadgets in an organized working area [28].

A study of teachers' attitude to their health has shown that in 2000, every third teacher did exercises and followed the diet (33.3%), was engaged in running, tourism and another kind of sport (38.9%); the schedule of work and rest was followed by every ninth only (11.1%); one third (33.3%) of teachers mentioned a lack of measures to promote their health [27].

In 2021, while answering a question about own health promotion, the majority (74.0%) of teachers mentioned 'the lack of bad habits', every second (42.6%) monitored the diet and was engaged in running, tourism and another kind of sport (45.5%); every third (32.8%) followed the schedule of work and rest. Every tenth (10.2%) teacher also noted a lack of measures to promote own health [28].

In 2000, the overall majority (100%) of interviewed teachers mentioned that preventive work with schoolchildren explaining the effect of harmful factors on health and work on building commitment to a healthy lifestyle should be initiated in primary school. Meanwhile, in 2021, 85.0% of teachers believed that a healthy lifestyle should be encouraged from the preschool age.

According to the opinion of the majority (over 70.0%) of teachers, preventive educational work related to promotion of a healthy life-style among schoolchildren both in 2000 and 2021 should be done within the framework of educational programs in biology, physical culture, and basics of life safety. In 2021, almost every third (over 40.0%) teacher mentioned the necessity of additional sanitary and educational work (lectures, conversations, areas of health, etc.) not directly associated with an educational program.

Data obtained during the questioning formed the basis for planning, carrying out and correction of preventive work with teachers and their hygienic education. The teachers were given lectures on the principles of a healthy lifestyle, risk factors of health problems that arise during education as well, and preventive measures. The teachers who participated in interdisciplinary thematic conferences and round tables were regularly informed via the site of an educational organization. The main topics covered during the educational activity were as follows:

- hygiene of the educational process;
- features of education of children with deviations in health status;
- prevention of musculoskeletal disorders and diseases of the organ of vision;
- peculiarities of organizing the conditions and mode of working with electronic devices;
- preventive measures of health disturbance among schoolchildren during their education and vacations;
- the role of motor activity while supporting students' health;
- a healthy way of life is a guarantee of health for the future generation.

DISCUSSION OF RESULTS

The obtained results indicate at an increasing number of teachers informed of factors posing risk to health, required measures of prevention, and principles of a healthy way of life. A number of teachers who did not take measures to promote their health dropped from 33.3% in 2000 to 10.2% in 2021. This became possible owing to the sanitary and educational work carried out from 2000 to 2021.

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ON ASSESSMENT OF PHYSICAL DEVELOPMENT OF UNIVERSITY STUDENTS

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Health of the younger generation determines the prospects of social and economic development of Russia. So, concern for healthcare of the youth is displayed in fundamental state documents (including the 'Fundamentals of the state youth policy of the Russian Federation for the period up to 2025') [1]. In accordance with its relevance, we conducted research aimed at examination of physical development of 1,820 students of the first and fourth years from four Universities of the Republic of Bashkortostan. Based on the past experience, standards of physical development for students from the Republic of Bashkortostan were developed and registered. A retrospective analysis was done comparing data related to modern students from the Republic of Bashkortostan and the ones related to the standard of physical development of students from the Republic of Bashkortostan obtained 25 years ago. The results reveal a tendency (during the last quarter of a century) to asthenization of modern youth from the Republic of Bashkortostan. The functional reserves of the cardiovascular and respiratory systems of students were assessed using the circulatory and respiratory Skibinski's index. It is established that in students, the mean Skibinski's index was 24.8 ± 0.3 , which corresponds to the 'satisfactory' range only. The program called 'Software to assess physical development and adaptation capabilities of the body' was developed and registered at the Federal Institute of Industrial Property aimed at determination of a risk group of diseases among students depending on their physical development, functional condition and adaptive capabilities of the body.

Keywords: students, universities, physical development standards, computer program

Author contribution: Gorbatkova EYu — research concept and design, data collection and processing, statistical processing, writing a text, editing, approval of the final version of the article, responsibility for integrity of all parts of the article; Akhmadullina KhM — research concept, approval of the final version of the article; Akhmadullin UZ — data collection and processing, research design; Zulkarnaev TR — approval of the final version of the article; Husnutdinova ZA — approval of the final version of the article; Manuilova GR — statistical processing.

Compliance with ethical standards: report of the local ethics committee 'Bashkir State Medical University' of the Ministry of Health of Russia as of Jan. 20, 2021 (protocol No. 1) was submitted. The participants signed the informed consent.

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ОБ ОЦЕНКЕ ФИЗИЧЕСКОГО РАЗВИТИЯ СТУДЕНТОВ ВУЗОВ

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Здоровье подрастающего поколения определяет перспективы социально-экономического развития России, поэтому забота о здоровьесбережении молодежи отражена в основополагающих государственных документах (в том числе в «Основах государственной молодежной политики Российской Федерации на период до 2025 года» [1]). В соответствии с актуальностью нами было проведено исследование, направленное на изучение физического развития 1820 студентов I и IV курсов четырех вузов Республики Башкортостан (РБ). По результатам работы разработаны и зарегистрированы стандарты физического развития студентов РБ. Проведен ретроспективный сравнительный анализ современных студентов РБ с данными стандарта физического развития обучающихся Республики Башкортостан 25 лет назад. Полученные результаты свидетельствуют о тенденции (за последние четверть века) к астенизации современной студенческой молодежи Республики Башкортостан. Проведена оценка функциональных резервов сердечно-сосудистой и дыхательной систем студентов с помощью циркуляторно-респираторного индекса Скибинской. Установлено, что средний показатель индекса Скибинской у студентов составил $24,8 \pm 0,3$, что соответствует лишь диапазону «удовлетворительно». Разработана и зарегистрирована в ФИПС программа для ЭВМ «Программное обеспечение для оценки физического развития и адаптационных возможностей организма», целью которой являлось определение группы риска развития заболеваний у студентов в зависимости от физического развития, функционального состояния и адаптационных возможностей организма.

Ключевые слова: студенты, вузы, стандарты физического развития, программа для ЭВМ

Вклад авторов: Е. Ю. Горбаткова — концепция и дизайн исследования, сбор и обработка материала, статистическая обработка, написание текста, редактирование, утверждение окончательного варианта статьи, ответственность за целостность всех частей статьи; Х. М. Ахмадуллина — концепция исследования, утверждение окончательного варианта статьи; У. З. Ахмадуллин — сбор и обработка материала, дизайн исследования; Т. Р. Зулькарнаев — утверждение окончательного варианта статьи; З. А. Хуснутдинова — утверждение окончательного варианта статьи; Г. Р. Мануйлова — статистическая обработка.

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The Law 'On Education in the Russian Federation' as of December 29, 2012 No. 273-FZ [2] pays great attention to health protection of students and includes health promotion and education.

Considering relevance of health preserving and promotion of the youth, we analyzed physical development of 1,820 students of the 1st and 4th years from four universities of the Republic of Bashkortostan (Ufa State Aviation Technical University, Bashkir State Agrarian University, Financial University under the Government of the Russian Federation, Bashkir State Pedagogical University named after Akmylla M.).

MATERIALS AND METHODS

Physical development of students was estimated at higher educational institutions using certified appliances. 22 indicators were analyzed with some of them (height, body mass, thoracic region, pulmonary capacity, timed inspiratory capacity, pulse during 1 min, spine flexibility) being described in this article.

The functional reserves of the cardiovascular and respiratory systems in students were assessed based on the circulatory and respiratory Skibinski's index. It was calculated as follows:

$$[(VLC \text{ (in ml)} / 100) \cdot A] / B,$$

where VLC is vital lung capacity in ml, A is breath holding after respiration (c), B is pulse rate (beats per min.).

Normal indicators: <5 for very bad, 6–10 for unsatisfactory, 11–30 for satisfactory, 31–60 for good, and >60 for very good [3, 4].

Portable spirometer (УСПЦ-01. Technical specification 9442–001–188596072007. Marketing authorization No. ФСП 2007/00694. Compliance certificate No. 11/0272016) was used to measure VLC.

Statistical methods of data processing such as r (correlation coefficient), R (regression coefficient), V (variation coefficient), σ (mean square deviation), t (Student t-test), M (weighted arithmetic mean), m (mean error of weighted arithmetic mean) were used while working with standards of physical development of students from the Republic of Bashkortostan.

The following results were obtained during this work:

- Incorporation certificate of database at the Federal Institute for Industrial Property No. 2018621629 'Tables evaluating physical development of students from Ufa, Republic of Bashkortostan' [5].
- Standards to assess physical development of students from the Republic of Bashkortostan (approved by the acting Minister of Healthcare from the Republic of Bashkortostan Zabelin MV No. 133 as of July 20, 2019; approved by the Chief Public Health Officer of the Republic of Bashkortostan Stepanov EG No. 158–19 as of May 05, 2019).
- Incorporation certificate of database at the Federal Institute for Industrial Property No. 2022620676 as of March 30, 2022 'Physical development of children, adolescents and youth in the Russian Federation in 2000–2001 (et al.)' [6].

RESEARCH RESULTS

The following mean indicators were obtained while working with **standards of physical development obtained from the students of the Republic of Bashkortostan who are 17 to 22 years old**: body length is 164.0 ± 0.3 and 176.8 ± 0.3 cm

and body mass is 56.8 ± 0.3 kg and 70.0 ± 0.2 kg in young women and young men, respectively.

Of those examined, 13.3% of male students and 13.1% of female students had the below-average level of physical development; whereas 1.9% of male students and 3.3% of female students had low physical development.

Retrospective comparative analysis was conducted based on the obtained results. 17-year-old students of today were compared with those studied in the Republic of Bashkortostan in 1996 [7]. 25 years later, young men were 2.3 cm higher (174.2 ± 0.39 and 171.9 ± 0.6 cm, $p < 0.05$), however, their body mass insignificantly increased by 0.2 kg (62.9 ± 0.5 kg in modern students and 63.1 ± 0.4 kg in those studying in the end of 1990s). Young women of today were only 0.5 cm higher as compared to those in 1996 (162.9 ± 0.5 and 162.5 ± 0.6 cm respectively). However, in young women of today, body mass was significantly lower (2.1 kg) than in those studying in 1990s (54.5 ± 0.5 and 56.6 ± 0.6 kg respectively, $p < 0.05$).

In relation to thoracic organs, a decrease in values was noted among students of both genders as compared to those studying in 1990s ($p < 0.05$). In young men, the indicator was 3.2 cm lower (85.2 ± 0.3 and 88.4 ± 0.7 cm), in young women, it was 4.6 cm lower (80.8 ± 0.4 and 85.4 ± 0.6 cm).

The results determined the tendency (within a quarter of a century) to asthenization of young students in Bashkiria.

1. When assessing the functional reserves of the cardiovascular and respiratory systems of students using the **Skibinski's circulatory and respiratory index** it has been established that the mean value was 24.8 ± 0.2 (within the 'satisfactory' range).

56% had a 'satisfactory' indicator, 12% results were 'very bad' and 'not satisfactory'. Only in 32% of young people the indicator ranged within 'good' and 'very good'.

2. Analysis of **flexibility indicators in the lumbosacral area of the spine** [8] has shown that in 61.6% of female students and 57.9% of male students the indicator was 'good' and 'excellent'. Meanwhile, 22% of women and almost every third young man (29.2% of all male students) had 'bad', 'very bad' and 'critical' indicators.

It has been established that the mean value of the indicator estimating the spinal flexibility constitutes 8.8 ± 0.2 cm in young women and 7.1 ± 0.1 cm in young men.

Gender-based differences were taken into account at this stage of the trial (fig.). As a whole, (all students) had a mean indicator of 8.1 ± 0.1 cm ('good').

During analysis of indicators of flexibility of the spine, the 'critical indicators' were observed in 7.9% of young men and 4.8% of young women.

3. As a result, we developed 'Software to estimate physical development and adaptive capabilities of the body' **computer program** (certificate No. 2020618022 as of July 16, 2020) [9]. The program is aimed at determination of risk of diseases in students depending on their physical development, functional condition and adaptive capabilities of the body.

Primary processing of data obtained while examining physical development and adaptive capabilities of students was done through the indicator aggregation method and using a generalized Harrington function during assessment of 11 clusters. Each cluster contains a number of indicators that characterize these or those qualitative attributes of students' health. The indicators were aggregated using the generalized Harrington function. Linguistic values of the indicator and quantitative intervals were compared using the desirability scale (table 2).

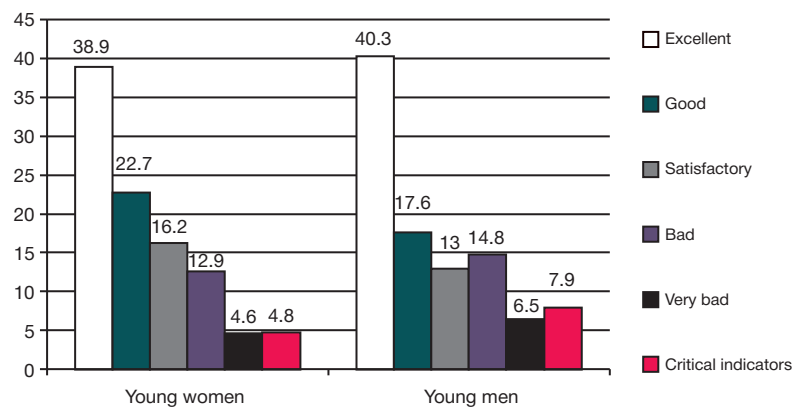


Fig. Distribution of students depending on flexibility in the lumbosacral area of the spine (young women and young men, %)

Table 1. Comparative analysis of flexibility in the lumbosacral area of the spine considering difference in gender-based criteria (%)

Evaluation criteria	Evaluation criteria for young females (cm)	Results (young females, %)	Evaluation criteria for young males (cm)	Results (young males, %)
Excellent	12 and more	38.9	10 and more	40.3
Good	8–11	22.7	7–9	17.6
Satisfactory	5–7	16.2	4–6	13.0
Bad	1–4	12.8	1–3	14.8
Very bad	–3–0	4.6	–5–0	6.5
Critical indicators	–4 and more	4.8	–6 and more	7.9

Table 2. Harrington's desirability scale

Desirability	Desirability marks
Very good	1.00–0.80
Good	0.80–0.63
Satisfactory	0.63–0.37
Bad	0.37–0.20
Very bad	0.20–0.00

The advantage of the function is that during aggregation and generation of the Harrington's desirability function the mutual effect of indicators is recorded in a non-linear way. In other words, compression by indicators or non-linear compression occurs. Numerical intervals of the generalized Harrington's desirability function were compared with linguistic estimates traditionally formulated in hygiene, which enables to identify health risk groups.

However, translation of a linguistic value of every indicator and quantitative interval using the desirability scale is very time-consuming. Thus, we developed software aimed at optimization of this process. It is necessary to differentiate between risk groups. It allows timely conduction of medical and pedagogical and social activities among students.

DISCUSSION OF RESULTS

Some authors also note an increased number of asthenic students. Galkina TN, a researcher, reported that 37% of students from Penza had an asthenic body type [10]. According to Kubieva SS et al. [11], a similar number of young women and men with normosthenic constitutional type (60% each) predominate among students from Tyumen. It means that there are 15% more of asthenic young men than young women, corresponding to a more significant number of asthenic male students as compared to female students.

A marked weight deficit was established in 22% of young men and 22.4% of young women from Ulyanovsk [12].

With age, the body weight gain occurs mainly due to fat deposit [13].

In women from Saratov, hygienic development was seen in 68% of cases [14]. In those educated in Vladivostok, weight deficit was found in 22% of young women and 10% of young men. 75% of young women and 71% of young men have balanced development [15]. According to Bokareva NA, it has been established that only 68% of young examined women from the Moscow Medical University had balanced physical development [16].

Considering high intensification of the educational process and hypodynamia of students, their physical upbringing becomes relevant [17].

According to Polish investigators, refusal from old control criteria makes it necessary to search for new forms of assessing physical condition of students [18].

CONCLUSIONS

The research results testify that it is necessary to conduct a preventive activity aimed at detecting students from the risk group and formation of positive hygienic behavior among young people.

Prenosological diagnostics that estimates physical development, functional condition and adaptive capabilities of the body enables to detect unfavorable tendencies in population health and timely conduct preventive activities.

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THE FEATURES OF SOCIAL AND AUTONOMIC ADAPTATION TO STUDY CONDITIONS DEPENDING ON AGE, GENDER AND SOCIO-PEDAGOGICAL EDUCATIONAL ENVIRONMENT


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The study is concerned with a pressing issue of assessing social adaptation (SA) and autonomic stability (AS) in the young people studying in various educational institutions. It is necessary to determine the students' social adaptation and autonomic stability at different ages. The study included 100 schoolchildren who living in the big city; 89 schoolchildren living in rural areas; 70 schoolchildren living and studying in the city boarding school. The schoolchildren were aged 14–15. The group of youth included 248 first-year students aged 17–18 and 136 6th year students aged 22–23. The study was performed with the use of the two-factor personality questionnaire by M. Gavrilova approved by the European Union for School and University Health and Medicine and adapted to Russian conditions. The authors provide data for determination of social adaptation and autonomic stability in young people aged 17–23. When analyzing the findings, it was found that the differences in social adaptation and autonomic stability between schoolchildren were partially dependent on their gender, type of learning, and place of residence. Given equal starting opportunities in young males and females in the beginning of high school training, young males showed higher SA and AS values compared to young females by the end of training. A group was distinguished that included students showing low SA and AS values, which, in our view, required psychological and medical rehabilitation. Given the findings, we believe that physicians should further examine the patients with low AS values, and psychologists (neuropsychiatrists) should further assess patients with low SA values during medical check-ups in order to ensure prevention and management of the disorders identified in schoolchildren and students.

Keywords: social adaptation, autonomic stability, schoolchildren, students

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ОСОБЕННОСТИ СОЦИАЛЬНОЙ И ВЕГЕТАТИВНОЙ АДАПТАЦИИ К УСЛОВИЯМ ОБУЧЕНИЯ В ЗАВИСИМОСТИ ОТ ВОЗРАСТА, ПОЛА И СОЦИАЛЬНО-ПЕДАГОГИЧЕСКИХ УСЛОВИЙ ОБУЧЕНИЯ


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Статья посвящена актуальному вопросу — оценке состояния социальной адаптированности (СА) и вегетативной устойчивости (ВУ) молодежи, обучающейся в различных образовательных учреждениях. Необходимо определить социальную адаптированность и вегетативную устойчивость у учащихся в различные возрастные периоды. В исследование было включено 100 школьников, проживающих в условиях крупного города; 89 учащихся, проживающих в сельской местности; 70 учащихся, проживающих и обучающихся в городской школе-интернате, в возрасте 14–15 лет. Группу молодежи составили 248 студентов первого курса 17–18-летнего возраста и 136 студентов 6 курса в возрасте 22–23 года. Исследование проводилось с использованием двухфакторного опросника М. Гавриловой, утвержденного Европейским союзом школьной и университетской гигиены и медицины, адаптированного к российским условиям. Авторами предлагаются данные для определения социальной адаптированности и вегетативной устойчивости для молодежи в возрасте от 17 до 23 лет. При анализе результатов исследования выявлено, что часть различий в социальной адаптированности и вегетативной устойчивости у школьников зависит от пола, типа обучения и места проживания. Учитывая равные стартовые возможности у юношей и девушек к началу обучения в вузе, к концу обучения юноши имели более высокие показатели СА и ВУ по сравнению с девушками. Была выделена группа учащихся с низкими показателями СА и ВУ, требующая, по нашему мнению, психологической и медицинской реабилитации. Учитывая полученные результаты, мы считаем, что для профилактики и коррекции выявленных отклонений у школьников и студентов в процессе диспансеризации врачу необходимо дополнительно обследовать пациентов с низкими показателями ВУ, а психологу (психоневрологу) — с низкими показателями СА.

Ключевые слова: социальная адаптированность, вегетативная устойчивость, школьники, студенты

Вклад авторов: В. М. Ганузин — научное руководство, сбор материала, статистическая обработка, написание статьи; А. Т. Барабошин — сбор материала, анализ литературы.

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Social adaptation (SA) and autonomic stability (AS) take a special place among factors that have a significant impact on the health of schoolchildren and students during their studies. In some cases, social adaptation and autonomic stability of students may be reduced, which in turn affects their quality of life and full implementation of the training program [1–5].

According to various authors, SA and AS of people involved in the educational process depends of many factors, such as learning environment, communication with fellow students and teachers, and place of residence [6–8].

The study was aimed to assess SA and AS in adolescents studying in various schools, students during their university adaptation, and graduates.

Table 1. Distribution of scores by quartiles in first-year students

Quartiles	Social adaptation (points)		Autonomic stability (points)	
	Young males	Young females	Young males	Young females
I	0–9	0–11	0–3	0–6
II	10–11	12–13	4–5	7–8
III	12–13	14	6–8	9–10
IV	15–20	15–20	9–16	11–16

Table 2. Distribution of scores by quartiles in 6th year students

Quartiles	Social adaptation (points)		Autonomic stability (points)	
	Young males	Young females	Young males	Young females
I	0–8	0–8	0–3	0–6
II	9–10	9–11	4–5	7–8
III	11–13	12–13	6–8	9–11
IV	14–20	14–20	9–16	12–16

Table 3. Social adaptation and autonomic stability according to the schoolchildren's gender and place of residence

Gender	Social adaptation, %			Autonomic stability, %		
	good	normal	poor	good	normal	poor
Boys (urban settings)	20.5	68.2	11.3	26.2	57.2	16.6
Boys (rural settings)	36.5	46.2	19.2	34.6*	57.7	7.7
Boys (boarding school)	21.7	63.0	15.3	11.7	58.8	29.5*
Girls (urban settings)	21.4	59.0	19.64**	30.4**	59.0	10.6
Girls (rural settings)	26.3	59.7	14.0	42.14**	45.6	12.3
Girls (boarding school)	40.9**	50.0	9.14**	5.2**	73.7	21.1**

Note: * $p < 0.05$ significance of differences in AS values between boys living in rural areas and the boarding school; ** $p < 0.05$ significance of differences in SA and AS values between girls living in rural areas, urban areas and the boarding school.

METHODS

The study involved 100 schoolchildren, among them 50 young males and 50 young females, living in the big city; 89 schoolchildren, among them 33 young females and 46 young males, living in rural areas; 70 schoolchildren, among them 42 young males and 28 young females, living and studying in the city boarding school. The schoolchildren's age was 14–15. The group of young adults included 248 first-year students, among them 124 young females and 124 young males aged 17–18, and 136 6th year students, among them 35 males and 101 females aged 22–23. Schoolchildren and students lived in the same climate and geographical region.

The adaptive capacity was assessed by determining social adaptation and autonomic stability. Evaluation of autonomic stability and social adaptation was performed using the two-factor personality questionnaire by M. Gavlinova approved by the European Union for School and University Health and Medicine and adapted to Russian conditions. The questionnaire made it possible to obtain the group characteristics of the studied cohort, it could be used for comparison with the groups of different social status, lifestyle, region of residence, etc. [6]. The standards reported by academician of RAMS A. A. Baranov were used as controls [6].

We developed separate SA and AS assessment scales for the first-year and 6th year students, the scores were divided into "good", "normal", and "poor" [7].

Taking into account the lack of standard SA and AS values for young adults studying in the universities, we developed the assessment scales for this age group [6, 7]. The distribution of scores obtained when processing the studied sample of young

adults by quartiles (Tables 1, 2) makes it possible to obtain the limits for individual assessment of surveyed individuals and their classification into groups, i. e. the groups with good, normal or poor SA and AS.

The data provided in Tables 1 and 2 show that the limits of autonomic stability found in all quartiles in young females and males have some differences, in contrast to social adaptation values showing no gender differences (Tables 1, 2).

Statistical data processing was performed using the tatSoft Statistica v.7.0 and Biostatistika 4.03 software packages. The analysis of contingency tables involved the use of chi-squared (χ^2) test and two-tailed Fisher's exact test. Two independent samples were compared using the nonparametric Mann-Whitney test. The differences were considered significant at $p < 0.05$.

RESULTS OF THE STUDY

Our study of adolescents studying in various schools revealed the following SA and AS values (Table 3).

The students' SA and AS values of are provided in Table 4.

DISCUSSION OF THE RESULTS

When assessing the SA and AS status in schoolchildren in accordance with their gender and place of residence the following values were obtained. The largest share of good SA values was observed in girls living in the boarding school and boys living in rural areas (Table 3). At the same time, one-fifth of urban girls and rural boys show low SA values, suggesting the difficulties in communicating with their fellow students and teachers. The smallest share of low SA values was observed in

Table 4. Social adaptation and autonomic stability according to the medical students' gender and year at the university

Gender	Social adaptation, %			Autonomic stability, %		
	good	normal	poor	good	normal	poor
Young males (1st year)	15.4	51.2	33.4	30.8	46.1	23.1
Young males (6th years)	34.4*	53.0	12.6*	25.0**	46.9	28.1
Young females (1st year)	18.5	48.4	33.1	26.6	51.6	21.8
Young females (6th year)	24.2	57.6	18.2	14.1	48.4	37.1

Note: * $p < 0.05$ significance of differences in SA values between the first-year and 6th year male students; ** $p < 0.05$ significance of differences in AS values between the 6th year male and female students.

girls living in the boarding school. High and normal SA values observed in the girls from the boarding school were possibly due to their greater autonomy and adaptation to living with others compared to adolescents living in families.

The following results were obtained when assessing the AS values of adolescents. The highest values suggestive of good AS were observed in rural boys and girls, while the lowest values were observed in girls living in the boarding school. We believe that the findings could be explained by living conditions, namely by the less pronounced negative effects on the central nervous system in rural adolescents and the most pronounced negative effects in adolescents living in the boarding school.

The SA and AS values observed in students, both female and male, had some features (Table 4). The number of first-year students showing good values was lower, and the number of those showing low values was higher compared to the 6th year students. In turn, the students' autonomic stability decreased by their 6th year, possibly due to prolonged increased load on the central and autonomic nervous systems along with insufficient physical exertion and motor activity. These data are in line with the data obtained by other researchers [8–10].

Assessment of the data obtained revealed significant gender differences in the AS values observed in male and female students. The number of young males showing good autonomic stability was larger and the number of those showing low autonomic stability was smaller compared to girls.

CONCLUSIONS

Analysis of the results showed that the differences in SA and AS values observed in schoolchildren were related to their gender, type of learning, and place of residence. Given equal starting opportunities in young males and females in the beginning of high school training, young males showed higher SA and AS values compared to young females by the end of training. Given the findings of students showing low adaptation, we believe that physicians should further examine the patients with low AS values, and psychologists (neuropsychiatrists) should further assess patients with low SA values during medical check-ups in order to ensure prevention and management of the disorders identified in schoolchildren and students. Moreover, special attention should be paid to students showing both low SA and low AS.

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AWARENESS OF AND ADHERENCE TO MEASURES OF INFLUENZA AND ARVI PREVENTION AMONG THE CITIZENS OF YEKATERINBURG

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According to experts, yearly flu rate can constitute 5–20% in adults and 20–30% in children; and in case of development of a pandemic, a number of those suffering from flu-like infection can be increased by 50%. Vaccination against influenza and properly used non-specific prevention can exclude seeking medical aid and hospitalization due to high incidence of COVID-19 and reduce the load to the healthcare system. Research purpose: examine awareness of children, young people and adults about signs of flu, methods of specific and non-specific prevention and their use in life. Materials and methods: the research was performed in three groups based upon online questioning: 270 adults aged 25 to 60, 1,112 students from universities and colleges aged 15 to 24, 101 schoolchildren aged 11 to 17. The questionnaire included sets of questions that reflected awareness of and commitment of population to measures of specific and nonspecific prevention. The students were questioned from January to February 2022. The obtained results show high flu and ARVI morbidity, insufficient hygienic education and commitment of citizens to the measures of specific and non-specific flu and ARVI prevention. To improve the situation, not just hygienic education is required, but also education of medical workers, parents, healthcare workers, journalists and correspondents of mass media regarding flu and ARVI prevention, availability of vaccine prevention centers, and consultations of pediatricians and therapists regarding the issues of specific prevention.

Keywords: specific prevention, nonspecific prevention, influenza, ARVI, vaccination, vaccination prevention

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Author contribution: Nasybullina GM, concept and methodology development, resourcing of the study, development of software, performance of the study, approval of the final version; Bayush MA, study performance, conducting statistical analysis, visualization, text preparation and editing; Mironova SS — study performance, conducting statistical analysis, visualization, text preparation and editing.

Compliance with ethical standards: questioning was organized by specialists from the department of Rospotrebnadzor for the Sverdlovsk region and Department of Education in Yekaterinburg using Google Forms. Prior to the questioning, an informed consent to the study was obtained, including the one from children and their parents.

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ИНФОРМИРОВАННОСТЬ И ПРИВЕРЖЕННОСТЬ ЖИТЕЛЕЙ ГОРОДА ЕКАТЕРИНБУРГА К МЕРАМ ПРОФИЛАКТИКИ ГРИППА И ОРВИ

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По оценке экспертов, ежегодная заболеваемость гриппом может составлять 5–20% у взрослых и 20–30% у детей, а в случае возникновения пандемий, число заболевших гриппозной инфекцией способно увеличиваться до 50%. Вакцинация против гриппа и грамотное применение неспецифической профилактики может предотвратить обращения за медицинской помощью и госпитализации в условиях высокой заболеваемости COVID-19 и тем самым снизить нагрузку на систему здравоохранения. Цель исследования: изучить информированность детей, молодежи и взрослых о проявлениях гриппа, методах специфической и неспецифической профилактики и их применении в своей жизни. Исследование проводилось на основе онлайн-анкетирования в трех возрастных группах: 270 взрослых от 25 до 60 лет, 1112 студентов вузов и колледжей от 15 до 24 лет, 101 школьник от 11 до 17 лет. Анкета включала в себя блоки вопросов, отражающие информированность и приверженность населения к мерам специфической и неспецифической профилактики. Анкетирование было проведено в период с января по февраль 2022 г. Полученные результаты свидетельствуют о высокой заболеваемости населения гриппом и ОРВИ, недостаточной гигиенической грамотности и приверженности граждан мерам специфической и неспецифической профилактики гриппа и ОРВИ. Для улучшения ситуации необходимо не только гигиеническое воспитание населения, но и обучение медицинских работников, родителей, работников сферы образования, журналистов и корреспондентов средств массовой информации в вопросах профилактики гриппа и ОРВИ, доступность пунктов вакцинопрофилактики, а также консультации у педиатров и терапевтов по вопросам специфической профилактики.

Ключевые слова: специфическая профилактика, неспецифическая профилактика, грипп, ОРВИ, вакцинация, вакцинопрофилактика

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Соблюдение этических стандартов: анкетирование было организовано специалистами Управления Роспотребнадзора по Свердловской области и Департамента образования г. Екатеринбурга на платформе Google Forms. Перед началом опроса было получено информированное согласие на участие в исследовании, в том числе от детей и их родителей.

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In light of the ongoing COVID-19 pandemic, other infectious diseases including flu and ARVI remain relevant, as their danger can't be underestimated [1]. Circulating among people for over 100 years, the flu virus with significantly altered antigenic properties still affects people of all ages, especially preschool age children [2]. According to experts' estimate, yearly flu incidence can constitute 5–20% in adults and 20–30% in children, whereas in case of pandemics a number of those with an influenza infection can be increased by 50% [1]. Vaccination against flu can prevent referral for medical aid and hospitalization due to high incidence of COVID-19 [3] and thus reduce load to the healthcare system [3].

Research purpose: study awareness of children, youth and adults about manifestations of flu, methods of specific and non-specific prevention and their use in life.

MATERIALS AND METHODS

The research was conducted based on online questioning in three age groups: 270 adults aged 25 to 60, 1,112 students of universities and colleges aged 15 to 24, 101 schoolchildren aged 11 to 17. The questionnaire included the following blocks of questions: data related to flu and ARVI, awareness of flu manifestations, measures of specific and non-specific flu vaccination, data related to flu vaccination, motives of vaccination and refusal from it, behavior in case of flu and ARVI (referral for medical aid, administration of medicines, limited contacts), sources of data about flu and ARVI prevention and attitude thereto. Data are analyzed using extensive values and related errors. Extensive coefficients display distribution of the phenomenon into constituents, its internal structure or relation of parts to a whole (specific gravity) and are expressed in percentage or fractions. The extensive index was calculated according to the following formula: part of phenomenon (environment)/whole phenomenon (environment) $\times 100\%$.

The indicator error was calculated as per formula: $m = \sqrt{P \cdot (100 - P) / n - 1}$, where P is the value of the extensive indicator, and n is a sample size.

The statistical significance of differences between the comparison groups was estimated by the Student's criterion for relative indicators: $t = (P_1 - P_2) / \sqrt{(m_1^2 + m_2^2)}$.

The statistical significance of differences was estimated at a significance level of $p \leq 0,05$.

Microsoft Excel 2010 (developed by Microsoft, USA) was the software package used for the purpose of statistical treatment.

RESEARCH RESULTS

It has been established that among those who have never suffered from flu and ARVI during a year the largest percentage was recorded in adults ($37.78 \pm 2.95\%$), the smallest one in schoolchildren ($7.92 \pm 7.22\%$) ($p < 0,05$ for all comparison groups) (fig. 1). The largest group of those surveyed who had this disease 4 times or more frequently was represented by students ($25.9 \pm 1.31\%$) ($p > 0.05$ for all comparison groups).

The majority of those surveyed believe that flu is a disease transmitted from a sick person to a healthy one by cough and sneeze ($61.85 \pm 2.96\%$ for adults, $67.99 \pm 1.4\%$ for students, and $79.21 \pm 4.04\%$) for schoolchildren ($p < 0.05$ among adults and schoolchildren, students and schoolchildren). $67.04 \pm 2.86\%$ of adults, $62.32 \pm 1.45\%$ of students and $41.58 \pm 1.45\%$ of schoolchildren ($p < 0,05$ among adults and schoolchildren, students and schoolchildren) are informed of flu complications such as pneumonia, bronchitis, myocarditis, otitis and lethal outcome. $52.59 \pm 3.04\%$ of adults, $63.49 \pm 2.08\%$ of students and $69.31 \pm 1.44\%$ of schoolchildren ($p < 0.05$ among adults and students, adults and schoolchildren) are aware of flu characteristics as a disease with a rise in temperature, dry cough and headache. A very small percentage of respondents believes that flu is not a dangerous disease and can be treated easily ($2.96 \pm 1.03\%$, $8.72 \pm 0.72\%$ and $13.86 \pm 0.85\%$ of population respectively) ($p < 0.05$ among adults and students, adults and schoolchildren).

Vaccination is the main method of flu specific prevention. The majority of those surveyed believe that a vaccinated person can suffer from flu but this disease will be mild and have no complications ($84.88 \pm 2.18\%$ for adults, $75.09 \pm 1.68\%$ for students, $70.3 \pm 1.3\%$ for schoolchildren). $61.78 \pm 2.96\%$ of adults, $51.71 \pm 2.25\%$ of students and $49.5 \pm 1.5\%$ of schoolchildren are informed that periodic vaccination is important due to annual variability of flu strains. $59.6 \pm 2.99\%$ of adults, $43.35 \pm 2.21\%$ of students and $41.58 \pm 1.49\%$ of schoolchildren know that vaccination done in autumn results in development of specific immunity during an epidemic rise in the incidence of the disease ($p < 0.05$ for all issues related to the value of vaccination in flu prevention among adults and students, adults and schoolchildren). At the same time, some vaccinated believe that vaccination is not obligatory due to sufficient natural immunity ($16.65 \pm 2.27\%$, $5.67 \pm 0.48\%$ and $17.82 \pm 0.69\%$ respectively) ($p < 0.05$ among adults and schoolchildren, students and schoolchildren).

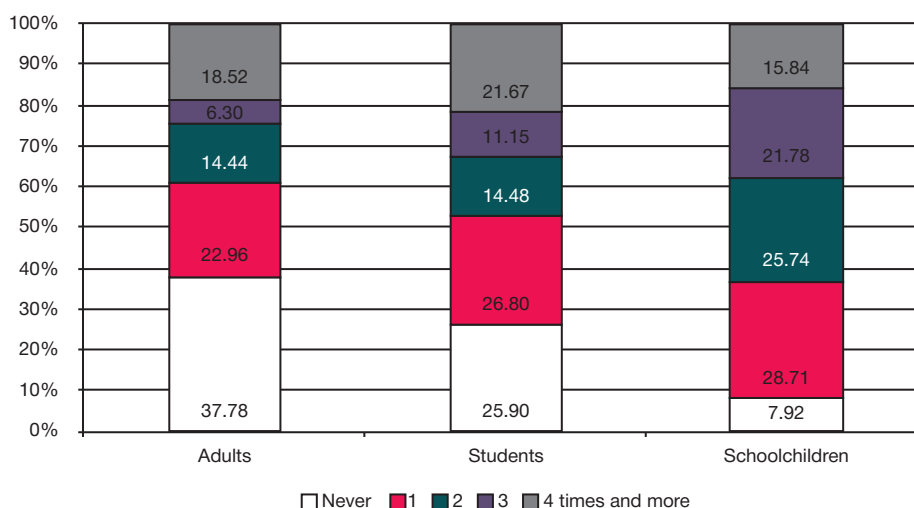


Fig. 1. Distribution of those surveyed by a number of previous flu and ARVI during the last year, %

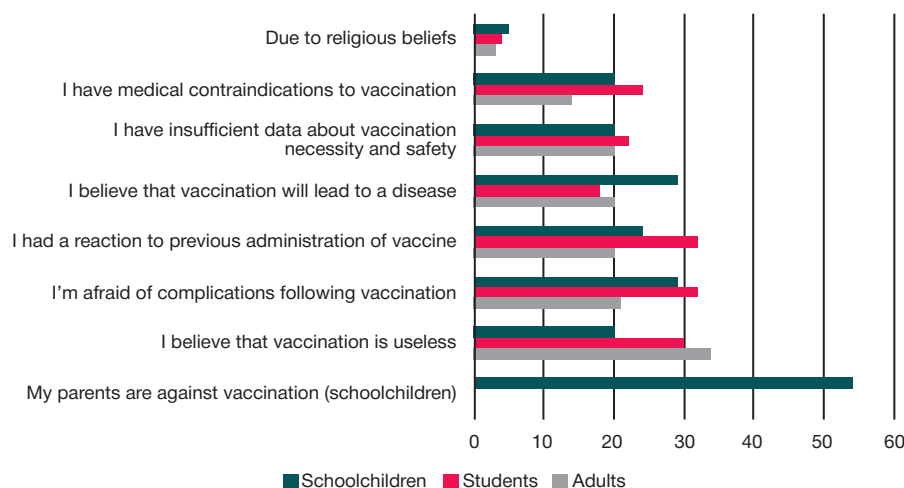


Fig. 2. Reasons for refusal from flu vaccination, %

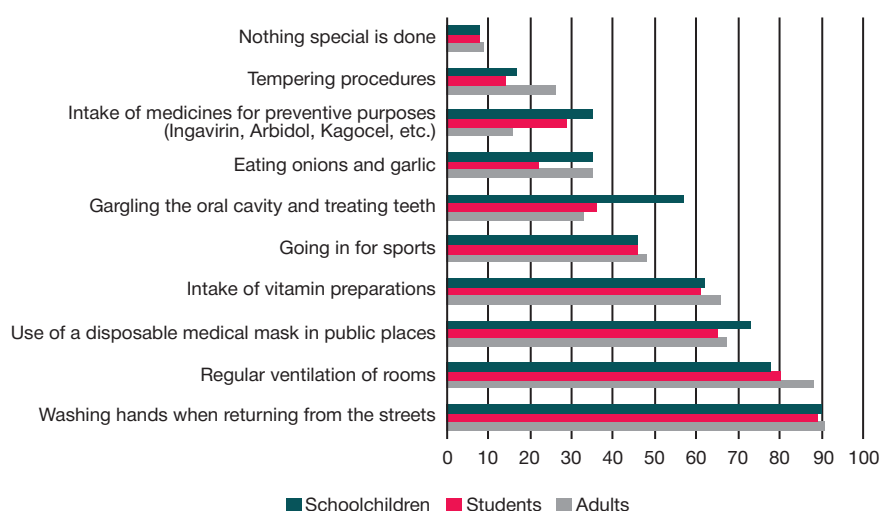


Fig. 3. Methods of non-specific prevention of flu and ARVI used by population, %

The greatest percentage of those requested from three groups had a neutral attitude to the vaccination ($46.67 \pm 3.04\%$ for adults, $66.1 \pm 1.42\%$ for students, and $46.53 \pm 4.96\%$ for schoolchildren). Mainly adults and children ($35.93 \pm 2.92\%$ and $36.63 \pm 4.79\%$ respectively) had a positive attitude to vaccination as compared with students (21.94%) ($p < 0.05$ among adults and students, students and schoolchildren). $29.63 \pm 2.78\%$ of adults, $27.16 \pm 1.33\%$ of students and $45.54 \pm 4.96\%$ of schoolchildren ($p < 0.05$ for schoolchildren as compared with students and schoolchildren) are vaccinated annually. Students avoid regular vaccination ($40.65 \pm 1.47\%$). Adults constitute the majority of those not vaccinated ($44.81 \pm 3.03\%$). Meanwhile, $53.7 \pm 3.03\%$ of adults reported that they vaccinate their children against flu every year. The majority of those vaccinated noted that their well-being was the same after vaccination ($50.6 \pm 3.04\%$ in adults, $63.48 \pm 1.44\%$ in students, $53.33 \pm 4.96\%$ in schoolchildren). A third part of those vaccinated had a rise in body temperature and fatigue ($30.12 \pm 2.79\%$, $30.19 \pm 1.38\%$ and $31.11 \pm 4.61\%$ respectively). Within a year following vaccination, the majority of those interviewed had flu and ARVI less frequently than usual ($62.58 \pm 2.95\%$ in adults, $63.48 \pm 1.44\%$ in students and $55.84 \pm 4.94\%$ in schoolchildren). The vaccinated included those who had no disease during a year ($23.93 \pm 2.6\%$, $22.71 \pm 1.26\%$ and $24.68 \pm 4.29\%$ соответственно) ($p > 0.05$).

A lack of parental consent was the main reason for refusal among schoolchildren who did not undergo vaccination (53.66

$\pm 4.96\%$). Schoolchildren also have an opinion that vaccination leads to a disease and complications ($29.27 \pm 4.53\%$ each). Among those requested, $34.31 \pm 2.89\%$ of adults and $30.34 \pm 1.38\%$ of students believe that vaccination is useless ($p < 0.05$). The majority of students are also afraid of complications following vaccination ($32.13 \pm 1.4\%$) and previous reaction to vaccination ($31.91 \pm 1.4\%$) (fig. 2).

Apart from vaccination, there is a large list of methods of flu and ARVI non-specific prevention. According to the survey, those from Yekaterinburg practice the following methods most frequently: washing their hands when they return from the streets (90.32%); regular ventilation of the room (82.01%); using a disposable medical mask in public places (68.35%); intake of vitamins (63.06%); going in for sports (46.49%); gargling of the oral cavity and treating teeth (42.24%) (fig. 3). There are also people who do not carry out preventive activities (8.15% in average).

When signs of flu and (or) ARVI occur, over half of adult population do not go to work ($54.07 \pm 3.03\%$), about $41.11 \pm 2.99\%$ do not work always depending on the severity of their condition. $83.33 \pm 2.27\%$ of parents do not send their children to schools, kindergartens, clubs and groups when signs of ARVI occur. Over half of students and schoolchildren ($74.91 \pm 1.3\%$ and $60.4 \pm 4.87\%$ respectively) attend an educational institution depending on their well-being, results of examinations and tests ($p < 0.05$). In case of flu and ARVI, over half of all respondents refer to a doctor depending on severity

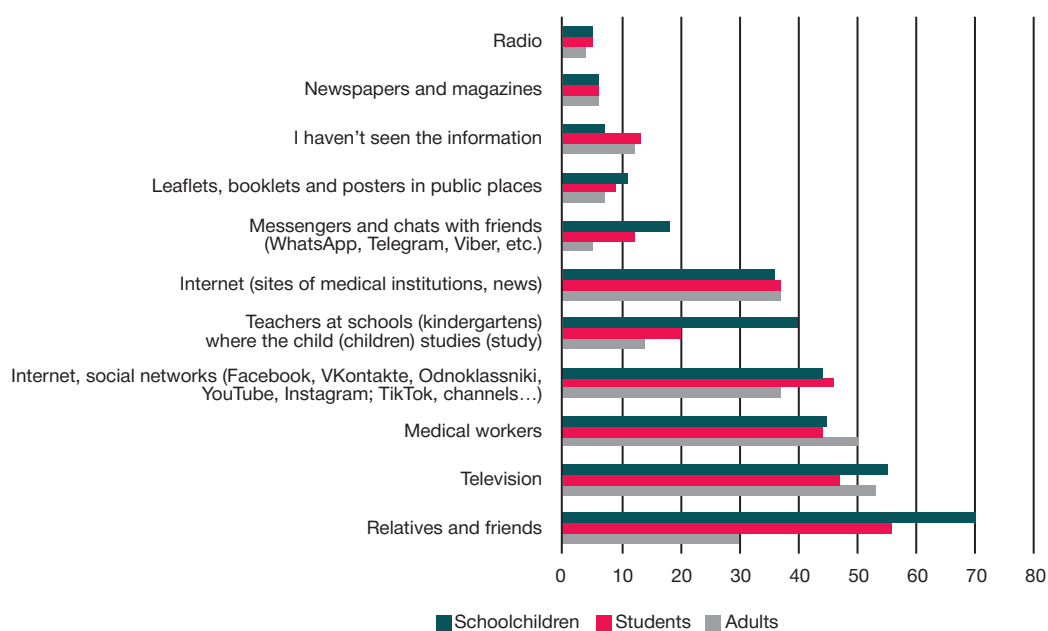


Fig. 4. Sources of useful information related to prevention of flu and ARVI, %

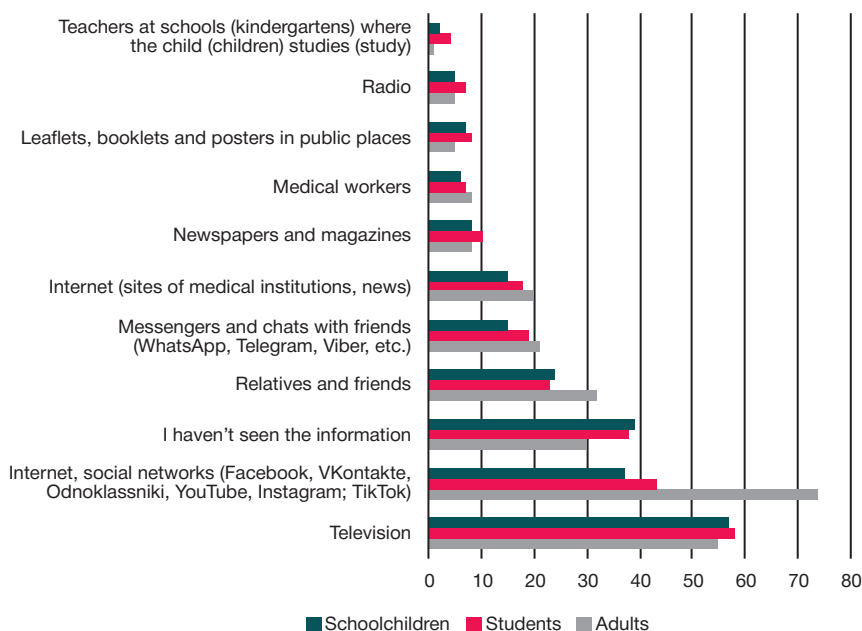


Fig. 5. Sources of negative information about flu and ARVI vaccine prevention, %

of their condition ($61.48 \pm 2.96\%$ of adults, $65.38 \pm 1.43\%$ of students and $54.46 \pm 4.96\%$ of schoolchildren) ($p < 0.05$ among students and schoolchildren). About $34.65 \pm 4.76\%$ of schoolchildren always ask for medical assistance, whereas $23.33 \pm 2.57\%$ of adults never do the same.

Regarding sufficiency of reliable information about methods of flu and ARVI prevention, a positive response was provided by $65.56 \pm 2.89\%$ of adults, $59.26 \pm 1.47\%$ of students and $40.59 \pm 4.89\%$ of schoolchildren ($p < 0.05$ for schoolchildren as compared with adults and students), 8.96% in every group gave a negative response, whereas all the others found it difficult to answer. In all three groups, useful information is obtained mainly through TV ($52.96 \pm 3.04\%$ for adults, $47.21 \pm 1.5\%$ for students, $55.45 \pm 4.95\%$ for schoolchildren) (fig. 4). The next source is represented by medical workers ($50.0 \pm 3.04\%$, $43.53 \pm 1.49\%$ and $44.55 \pm 4.95\%$ respectively), social networks ($37.41 \pm 2.94\%$, $45.68 \pm 1.49\%$ and $43.56 \pm 4.93\%$ respectively), sites of medical institutes

($37.41 \pm 2.94\%$, $36.6 \pm 1.44\%$ and $35.64 \pm 4.77\%$ respectively) ($p > 0.05$). Students ($55.67 \pm 1.49\%$) and schoolchildren ($70.3 \pm 4.55\%$) obtain the most significant part of prevention-related data from relatives and friends as compared with adults (29.63% , $p < 0.05$). Those requested also include persons who didn't obtain prevention-related data: $12.22 \pm 1.99\%$ for adults, $12.68 \pm 1.0\%$ for students, and $6.93 \pm 2.53\%$ for schoolchildren.

As far as all information sources go, population has the most trust in medical workers ($69.26 \pm 2.81\%$ of adults, $63.13 \pm 1.45\%$ of students, $59.41 \pm 4.89\%$ of schoolchildren) ($p > 0.05$), relatives and friends ($23.7 \pm 2.59\%$, $46.4 \pm 1.5\%$ and $53.47 \pm 4.96\%$ respectively) ($p < 0.05$ for adults as compared to students and schoolchildren).

According to the results of questioning, the leading sources of negative information about vaccine prevention include television, social networks, and data obtained from relatives and friends (fig. 5). The leading positions regarding provision of

negative information are occupied by television: the fact was noted by $54.81 \pm 3.03\%$ of adults, $58.36 \pm 1.48\%$ of students and $57.43 \pm 4.92\%$ of schoolchildren. All three groups obtained negative data through the social networks: adults ($74.44 \pm 2.65\%$), students ($43.17 \pm 1.49\%$) and schoolchildren ($36.63 \pm 4.79\%$) ($p < 0.05$ for adults as compared with students and schoolchildren). The next source of information is presented by relatives and friends who provided negative data noted by $31.85 \pm 2.84\%$ adults, $22.75 \pm 1.26\%$ students and $23.76 \pm 4.24\%$ schoolchildren. At the same time, those surveyed include persons who did not come across negative data about vaccine prevention: $30.37 \pm 2.8\%$ in adults, $37.77 \pm 1.45\%$ in students, $38.61 \pm 4.84\%$ in schoolchildren ($p < 0.05$ among adults and students).

DISCUSSION OF RESULTS

The most frequently used methods of non-specific prevention for citizens of Yekaterinburg include as follows: washing hands when returning from the streets, regular ventilation, use of a disposable medical mask in public places, intake of vitamins. As compared with literature data from studies of Rakhmanova OV, Podkopaeva DS, Barteneva AA and Churilova MO 'Adherence of students from the Kursk State Medical University to flu and ARVI prevention', frequency of these activities against pandemic of novel coronavirus infection significantly increased (by 20–25% in average) [4].

CONCLUSIONS

Thus, according to the survey, those from Yekaterinburg had a high incidence of flu and ARVI, especially students and schoolchildren. The majority of those surveyed believe that flu is a disease spread with cough and sneeze from sick to healthy

persons. Possible complications make it dangerous. Many respondents believe that periodic vaccination is important as those vaccinated will have a mild disease without complications.

About half of population have a neutral position to vaccination with a positive attitude being greater in adults and children. Adults are vaccinated less commonly, but over half of them vaccinate their children. The majority of those surveyed felt no changes in well-being after vaccination and suffered from flu and ARVI less frequently.

The schoolchildren who did not undergo vaccination refused to do so due to a lack of parental consent and fear of manifestations of diseases and complications. A significant number of adults and students believe that vaccination is useless if used for preventive purposes.

If signs of flu and ARVI are available, over the half of adults do not go to work and ask for medical assistance irrespective of their condition. Schoolchildren and students go to an educational institution depending on their well-being, tests and examinations.

The majority of respondents from every group believe they are well aware of preventive methods and obtain such information mainly via TV, social networks and medical workers, whereas students do the same through their relatives. At the same time, the majority of them come across negative data about vaccine prevention of flu and obtain the info through television, social networks, relatives and friends.

These results are illustrative of insufficient hygienic literacy and adherence of population to the measures of specific and non-specific prevention of flu and ARVI. To improve the situation, not just hygienic education of population is required, but also education of medical workers, parents, educators, journalists and mass media correspondents regarding prevention of flu and ARVI, accessibility of vaccine prevention centers, and consultations by pediatricians and therapists on the issues of specific prevention.

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REVIEW OF FACTORS DETERMINING LIVING CONDITIONS OF MODERN SCHOOLCHILDREN

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Preservation and strengthening of health in the rising generation is declared as a key direction of the state policy in the Russian Federation. Systematic long-term influence of environmental factors, including mode of living and nutrition, on the processes of formation of health and physical development in children is currently taken as a pressing issue for the entire state, with regional peculiarities, specific to certain regions of Russia. The paper presents an analysis of modern Russian and foreign scientific literature regarding the influence of various environmental factors, conditions of training and education, basic components of the day regime and dietary habits on health of schoolchildren. Literature sources were searched through eLibrary, PubMed, Cyberleninka for the period from 2015 to 2022. In spite of the activities related to health protection of children and adolescents conducted by the state, official statistics and numerous studies display a continuous growth of the so-called school-associated morbidity. Analysis of historical data shows that effect of school and out-of-school factors on health of children and adolescents remains very pressing. Under these conditions, increased literacy of parents, teachers and children regarding hygienic education, formation of a healthy lifestyle and determination of managed sanitary and hygienic factors that can produce a positive influence on health and physical development of schoolchildren is given a great importance.

Keywords: physical development of children and adolescents, environmental factors of schoolchildren, daily regimen and nutrition, healthy way of life, hygienic education

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ОБЗОР ФАКТОРОВ, ОПРЕДЕЛЯЮЩИХ УСЛОВИЯ ЖИЗНЕДЕЯТЕЛЬНОСТИ СОВРЕМЕННЫХ ОБУЧАЮЩИХСЯ

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Сохранение и укрепление здоровья подрастающего поколения декларируются как одно из ключевых направлений государственной политики Российской Федерации. В настоящее время систематическое длительное воздействие факторов среды обитания, в том числе образа жизни и питания, на процессы формирования здоровья и физического развития детей является актуальной проблемой всего государства, с региональными особенностями, специфическими для конкретных субъектов России. В работе представлен анализ современной отечественной и зарубежной научной литературы о влиянии различных факторов среды обитания, условий обучения и воспитания, основных компонентов режима дня и особенностей питания на здоровье детей школьного возраста. Поиск литературных источников проводился в базах данных eLibrary, PubMed, Cyberleninka в период между 2015 и 2022 гг. Несмотря на проводимые государством мероприятия по охране здоровья детей и подростков, данные официальной статистики и многочисленных исследований демонстрируют продолжающийся рост так называемой школьно-обусловленной заболеваемости. Анализ литературных данных показывает, что проблема воздействия как школьных, так и внешкольных факторов на состояние здоровья детей и подростков остается чрезвычайно актуальной. При таких условиях большое значение приобретает повышение уровня грамотности родителей, педагогов и самих детей по вопросам гигиенического воспитания, формирование установок здорового образа жизни и определение управляемых санитарно-гигиенических факторов, способных оказать положительное влияние на состояние здоровья и физическое развитие школьников.

Ключевые слова: физическое развитие детей и подростков, факторы среды обитания школьников, режим дня и питания, здоровый образ жизни, гигиеническое воспитание

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Health of children as an age group that constitutes the fundamental basis for the future state is one of the most important developmental characteristics. Due to high significance, numerous studies of Russian and foreign authors are devoted to examination of health and physical development of children [1–10].

Health protection and providing conditions for favorable growth and development of children and adolescents are included into priority areas of the state policy of the Russian Federation. They are based on formation of the teaching and educational process in accordance with sanitary standards and rules, performance of which will ensure preservation and strengthening of students' health. Restructuring the system of school education, digitalization of educational process, influence both of intra-school and extra-school factors produce

a significant effect on health formation of the rising generation [11, 12].

Research purpose is to analyze and generalize the results of scientific studies regarding the influence of environmental factors on health of schoolchildren in Russian and foreign sources from 2015 to 2022.

MATERIALS AND METHODS

The scientific articles published from 2015 to 2022 that consider the influence of environmental factors, conditions of education and upbringing, basic components of daily routine and nutrition on health of schoolchildren were reviewed. The search is done through the following databases (eLibrary, PubMed, Cyberleninka).

RESEARCH RESULTS

The existing model of educational organizations can be characterized as a multifactorial dynamic system leading to formation of a harmoniously developed and healthy personality [13, 14]. At the same time, many authors note that most of the day schoolchildren are under the influence of physical, biological, ecological, chemical, psychoemotional and other environmental factors for 11 years [15–20].

The acting educational standards are characterized by higher requirements to how education is organized. In its turn, this complicates the educational process and increases workload. In the majority of cases schooling is not consistent with physical development and health of a certain student, school teachers are not qualified enough regarding hygienic education, many parents and schoolchildren almost lack the skills of formation of a healthy lifestyle [21–25].

According to the results of numerous scientific research conducted both in Russia, and in other countries of the world during the first two decades of the new millennium, an increased number of children with overweight is found. In perspective, this can lead to an increase in the incidence of diseases due to obesity. Lifestyle of modern schoolchildren is characterized by insufficient motor activity, less time spent on walking, active outdoor games and training in sports sections, long-term watching TV, computer, smartphones or tablet games. Hypodynamia does not only determine the disharmonic physical development of children and adolescents, but also constitutes a risk factor of obesity and overweight [26–28].

Health of children and adolescents depends on nutritional regimen which is one of the main components of a lifestyle. Rational nutrition promotes balanced physical development, improves mental performance and physical activity, and non-specific protection of a child from unfavorable environmental factors. Intensive processes of a child's growth and development combined with high psychoemotional load due to a constantly evolving educational process and long-term effect of various factors of the school environment place increased requirements for the functional condition of a child's body. It includes arrival of all necessary nutrients in optimal amounts in case of properly organized regimen of nutrition both at school, and at home. Actual nutrition of modern schoolchildren is non-rational almost everywhere in the Russian Federation. When assessing the qualitative composition of food, low content of animal fat, vegetable fat and individual microelements is detected. The diet includes cereals, confectionary products and snacks. Children and adolescents prefer fast food, chips and biscuits, whereas a significant shortage of meat and milk is observed. Researches of many authors, including foreign ones, point at long-term intervals between food intakes, lack of breakfast and presence of late supper, resulting in reduced mental and physical performance, and body's defenses.

A number of researchers who examined eating habits of schoolchildren concluded that non-correspondence between qualitative and quantitative diet's characteristics, age and gender can produce an unfavorable effect on mental and physical performance of children and adolescents, increase a risk of metabolic disturbances, hypovitaminosis and microelementosis. A lack of the single systemic approach in implemented sanitary and hygienic activities aimed at prevention of overweight and obesity in children should also be noted [29–36].

Intense education at school is accompanied by stress resulting in sleep disturbances. Short sleep at night (less than 7 or 8 hours) can produce a negative effect on physical development. Sleep deficiency in schoolchildren is associated

with a long-term presence in social networks, computer games, and watching audio and video clips on different electronic devices. Disturbances of sleep and wakefulness regimen increase the risk of obesity, depression and anxiety, insomnia disorders associated with disturbed production of melatonin, pathologies of locomotor apparatus and organ of vision [21, 37–41].

A wide use of information and communication technologies (ICT) is a distinctive feature of modern education. In school education, electronic devices provide free access to various information resources, possible distant learning and learning interactivity, formation of educational communities with a flexible time and space schedule. Schoolchildren obtain any necessary or new information by searching it on the Internet without much effort [12, 14].

The current generation lives in hypermedia space. The data is a show of various events, distinctive and key feature of which is represented by an ability to attract attention of the user. Formation of digital environment is characterized by occurrence of factors capable of producing an unfavorable effect on health and physical development of children. Thus, while working with laptops a risk of disturbances of the locomotor apparatus and visual disorders is increased, as younger schoolchildren can't preserve a physiologically correct working posture. It is established that while reading from the display of an electronic device a number of eye movements and electroencephalographic activity of the brain is increased as compared with paper-based media. This testifies to marked fatigue of the CNS leading to a decrease in concentration, distraction and inability to perceive homogenous information [13, 21, 42–44].

To preserve and strengthen health of students, lessons of physical culture are available at school. However, coverage of students engaged in the lessons of physical culture is incomplete and doesn't allow to compensate for the need in movements completely. There are many reasons of poor physical activity. Thus, duration of outdoor walking and games, especially in the weekends, constitutes less than 2 hours. Children and adolescents prefer watching TV, playing computer games, using tablets and portable game consoles over physical educational and going in for sports [45].

DISCUSSION OF RESULTS

The future intellectual and economical potential of the state and its defense capability are determined by healthy generation. However, morbidity of children demonstrates a steady growth within the last decades [1, 2].

Among schoolchildren, insufficient duration of separate components of daily regimen (motor activity, walking, night sleep) is observed. The reasons for an unhealthy way of life include a low level — and in some cases total lack — of motivation for going in for sport, lack of time because of an irrationally organized daily regimen, active use of ICT during a day, and at night. Disturbances of qualitative and quantitative characteristics are found among schoolchildren: obligatory presence of bakery and confectionary products, pasta and snacks in the diet, long-term intervals between meals, late supper and lack of some food products [30].

Properly used ICT can be very useful for modern schoolchildren. This fact is noted both by Russian and foreign researchers. Internet resources related to a healthy lifestyle are of particular importance. Promotion of a healthy lifestyle is a complex systemic process of working with population. Its purpose is to develop a responsible attitude to own health. Schoolchildren obtain data about the basic components of a healthy way of life from the network, less and less referring to parents and teachers

as the basic source of data. There is high involvement of girls and boys, positive influence of social networks, Internet sites with thematic interactive games, quizzes, actual video content, virtual societies and health centers that develop the issues of a healthy lifestyle and consult everyone who seems interested on the issues of hygienic education [46–50].

CONCLUSIONS

Thus, analysis of modern Russian and foreign literature data shows that the influence of environmental factors on health of children remains extremely urgent.

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