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Determination of the development of physical inactivity among schoolchildren

This article discusses ways to determine the degree of hypodynamia among students at school and suggests a method for determining the symptoms of hypodynamia. As a result of the questionnaire, the risk groups of hypodynamia among students were identified. The physiological state of these groups can be further determined. Analyzing the results of the questionnaire, it was found out that more than a half of pupils prefer inactive form of rest in their free time. Increased appetite due to hypodynamia leads to obesity, further increasing body weight and preventing exercise. The occurrence of hypoxia due to reduced motor activity, damage to cerebral blood vessels can contribute to a decrease in memory, cause abnormalities leading to a decrease in mental performance, neurosis. The first signs of hypodynamia include weakness, sleep disturbances, headaches and overweight. Analysis of the questionnaire results showed that every tenth pupil regularly does morning exercises, a quarter attend sports clubs, moreover, an important factor limiting the motor activity of pupils is the learning process accompanied by a significant number of activities. The absence of the above signs of hypodynamia is characteristic of half of the students, and the "overweight problem" is characteristic of a quarter of the students. All this is a risk of the development of more severe consequences of hypodynamia.

Keywords: school, hypodynamia, physiological condition, hygiene, natural movement, overweight, sports, musculature, atrophy.

Introduction

Decreased physical activity in modern life, insufficient development of mass forms of physical culture among the population, lack of time for physical culture and sport due to the intense dark life, extensive use of cars, computers, television and video, all this is the cause of sedentary lifestyle and leads to deterioration of the functions of organs and systems and the appearance of symptoms [1].

Hypodynamia is a disease of modern society. Today, every second adult in the world follows a sedentary lifestyle, and this figure is the most alarming, including among young people and students. Research on the health of students helps to organize effective measures to improve the health of future teachers [2].

Hypodynamia has become a problem in the modern world. Cars, elevators, various household appliances, computer work, and other common things have a negative impact on health — a person leads a less active lifestyle, and there are mood problems [3].

In sedentary children, weakness of the muscular system and postural disorders are noted. The consequences of physical inactivity can serve as a prerequisite for the development of a number of non-communicable diseases in the population; therefore, they are subject to timely diagnosis and correction [4].

Leading pathogenetic links are the disruption of energy and plastic metabolism, which primarily affects the musculoskeletal system [5].

In general, hypodynamia has such bad impacts on human being's life as physical inactivity, neuropsychiatric disorders, weight gain, bad habits — smoking, alcohol, etc. All of these conditions are risk factors for various diseases [6]. Pathological changes in the body develop not only in the absence of movement but also in a normal lifestyle. The movement mode does not correspond to the genetic program "thought out" by nature. Insufficient physical activity leads to metabolic disorders, impaired resistance to hypoxia (lack of oxygen) [7].

Under hypodynamia is meant complex changes that occur in the functional state of the body, primarily life-support systems, due to insufficient amount of motor activity [8].

The presence of overweight among schoolchildren is becoming a pressing problem worldwide. Its development depends on genetic and lifestyle factors, including physical activity. During the school period, children no longer exercise as most of their time is spent on television or video games [9].

Since 2020, when schoolchildren and students around the world switched to mass online learning due to the coronavirus pandemic, the time spent online reading lessons and sitting at a desk and using a computer for homework has also increased significantly. All of these factors contribute to being overweight due to hypodynamia.

Hypodynamia is the cause of many human diseases. The World Health Organization concluded that 81 % of children worldwide are physically inactive [10].

Purpose of the work: to identify the extent of hypodynamia among schoolchildren.

Experimental

Pupils from the city of Taldykorgan took part in the study. Forty pupils (average age — 13 ± 0.6 years) from the eighth grade were obtained. The survey method was used.

Results and Discussion

For the survey, we prepared several questions. The first question that we asked pupils was “How much time do you spend a day sitting at the table?”. The educational process, accompanied by a significant number of classes, is an important factor limiting motor activity of students, as evidenced by Figure 1. It is clear that 58 % spend their time more than 5 hours, one-third spend four to five hours, and only 7 % spend 3–4 hours a day.

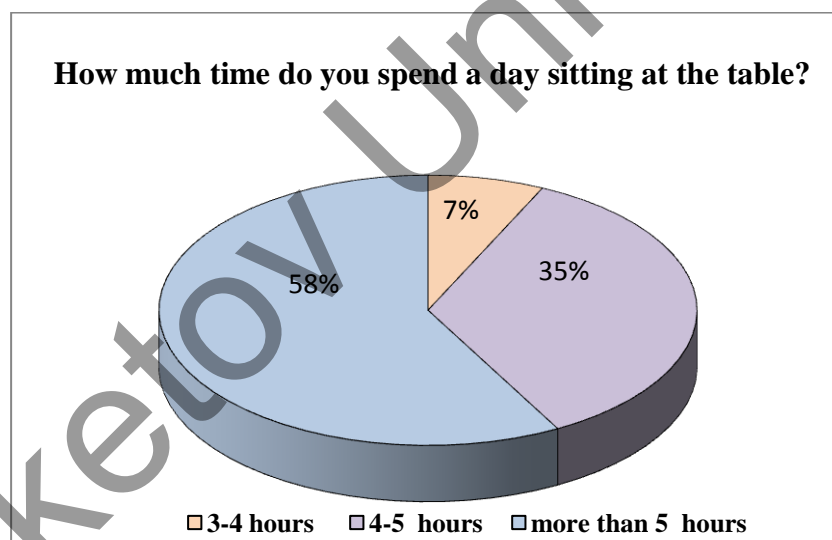


Figure 1. The time during which students sit at the table

At the same time, it was found that increasing the hygienic duration, the majority of respondents (93 %) sit at a computer for more than 4 hours a day.

The next question, “Are you attending additional sports classes?”, was asked to determine students’ physical activity (Fig. 2). 45 % of pupils indicated that they attend sports sections, 45 % indicated that they do not attend, and 10 % of the respondents reported that they temporarily do not attend. An alarming situation leading to hypodynamia is that about half of the respondents have low physical activity and spend a lot of time working with a computer.

Hypodynamia is a pathological condition characterised by impairment of virtually all human functions (respiratory, digestive, circulatory, and circulatory functions) through reduced motor activity, resulting in reduced muscle contractility.

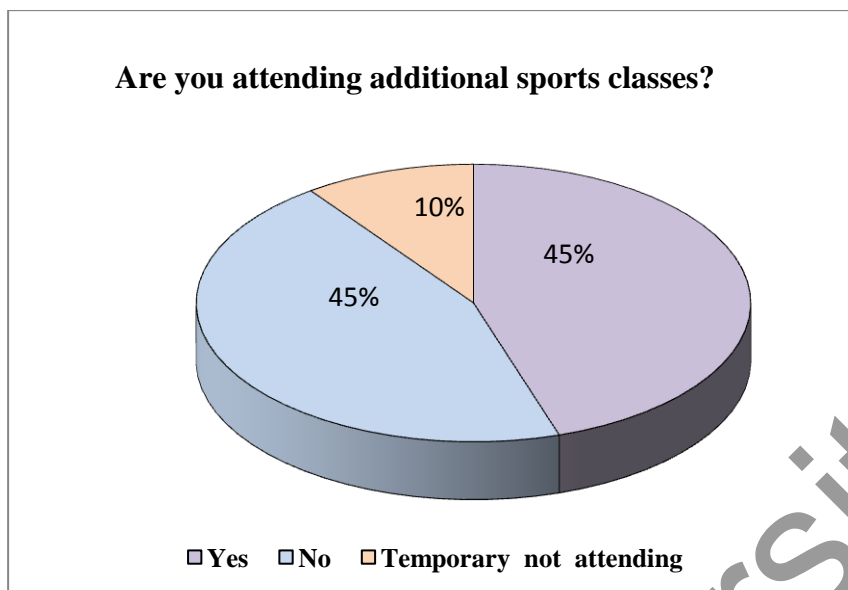


Figure 2. Number of students attending additional sport classes

Prolonged hypodynamia causes a gradual atrophy of the muscular apparatus, followed by a decrease in calcium in the bones and osteoporosis. Increased appetite against a background of hypokinesia leads to obesity. Later on, the excess weight prevents exercising. Hypoxia, a lack of air in the cerebral vessels, can impair thinking and memory and contribute to a tendency towards further abnormalities. Weakness, headaches, sleep disturbance, overweight are the first signs of hypokinesia. The majority of the surveyed students (45 %) have the above symptoms (Fig. 3).

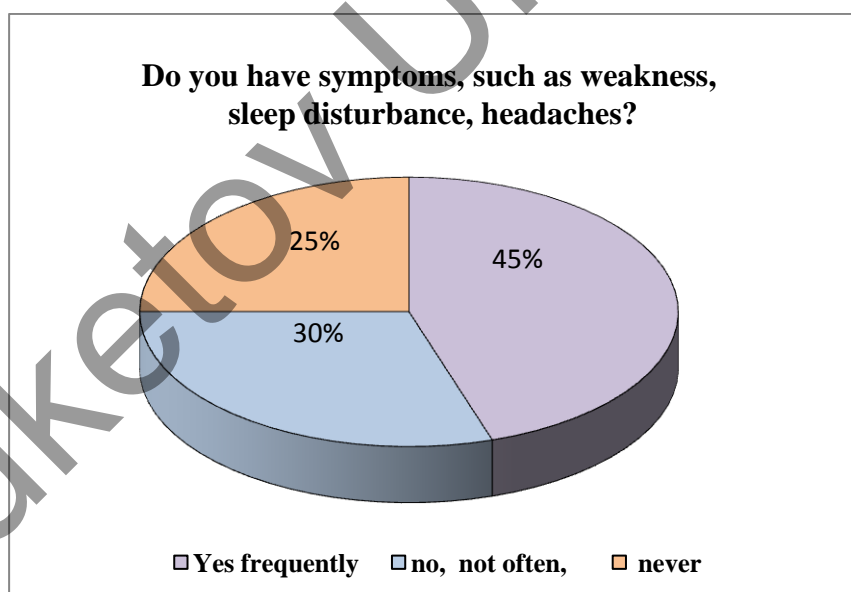


Figure 3. Pupils with signs of physical inactivity

An “overweight problem” was identified in 75 % of pupils (Figure 4). All of these are risks of developing more severe consequences of hypodynamia.

The problem of being overweight has various causes: hereditary predisposition, overeating — excessive or caloric food, late lunch, unbalanced diet — craving for carbohydrate products, carbonated drinks, sweet fruit juices, sedentary lifestyle — sedentary work, not exercising, etc. [11].

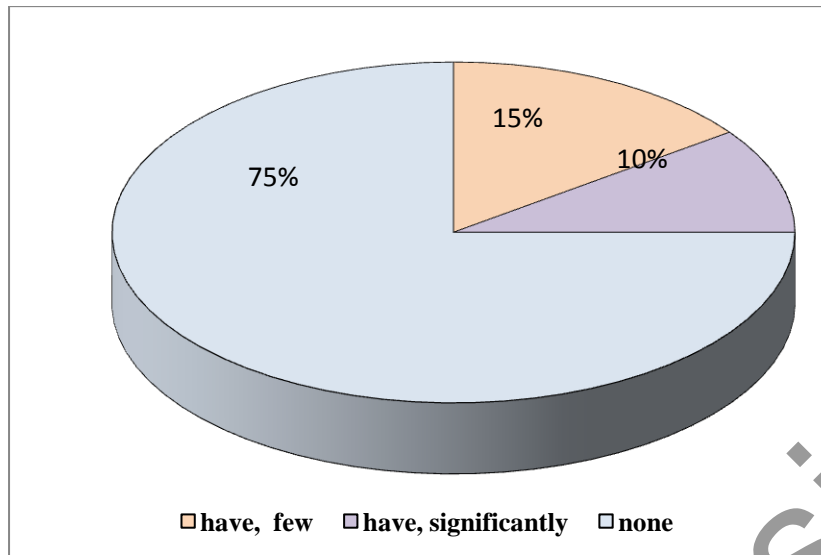


Figure 4. Overweight students

Even in the presence of symptoms of hypokinesia, to find out why pupils do not devote enough time to sport, they needed to answer the question, “Do you have enough time to exercise as much as you need?”. Only 18.3 % of those surveyed gave a positive answer (Fig. 5).

The pupils cited the complexity of the curriculum, inefficient lesson schedules, and large amounts of homework as the main reasons for the lack of time for sports activities.

Organised forms of physical education are the basis for their active adaptation, as the period of activity is often shortened or replaced by other activities. Most students do not have information about their medical group membership for physical activity.

A consequence of hypokinesia is hypodynamia, which can be determined by measuring indicators of a number of physiological body systems.

Anthropometric methods of examination and the Quetelet’s index will be determined in the future to clarify the results of the questionnaire.

The risks arising from reduced physical activity in students indicate the need for increased monitoring of the conditions for correcting lifestyles and the organisation of the learning process.

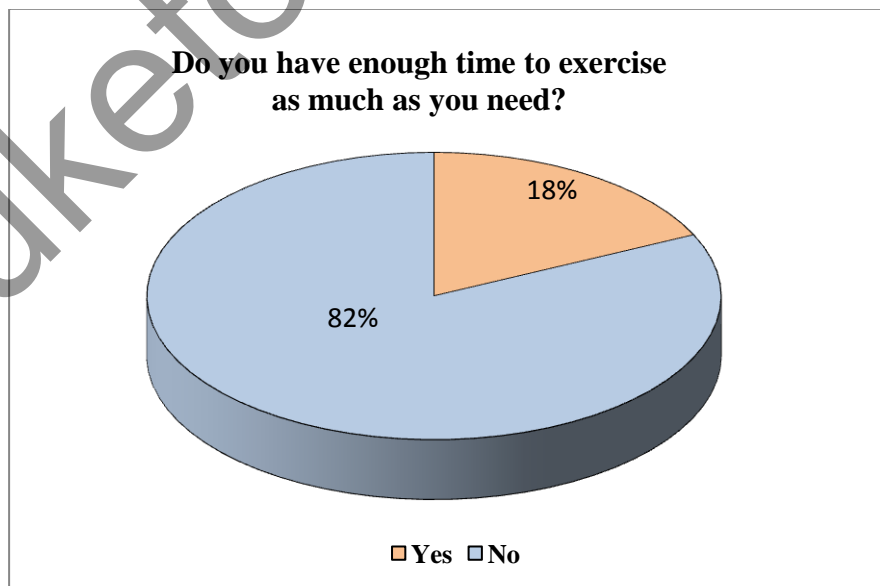


Figure 5. Pupils’ time for exercising

Conclusions

Nowadays, society is marked by the success and need of a person who is educated, able to argue his/her point of view, and has creative potential. It is necessary to prepare oneself for the fact that it is important not only to learn, but also to multiply, to engage in creativity and to apply it in practice. Therefore, it is important to involve students in research work from school. This is not only an effective method of deepening knowledge on a topic but also a great opportunity to reveal their research skills and to test their speaking abilities in an unfamiliar audience.

According to the study, the students' lack of physical activity, insufficient understanding of the role of behavioural factor in health promotion (walking advantage), inadequate assessment of their own lifestyle (long work with computers) are one of the most relevant problems among schoolchildren. Thus, this study demonstrates a widespread of the phenomenon of hypodynamia among school students. During the survey, we identified a number of students who have symptoms of hypodynamia, but, at the same time, students understand that the problem of hypodynamia is urgent and needs to be dealt with. The survey is of great importance in obtaining information about physical activity and the likelihood of hypodynamia in students [12].

Physical activity of students should consist of several inclusions: physical activity in physical education, physical activity in education (physical activity breaks), socially useful and work activities, physical activity in leisure time [13].

Intensive health promotion, e.g., increasing students' awareness and knowledge, encouraging healthy eating and outdoor activities, can have a significant impact on reducing the risk of obesity. Health education is needed in schools for children, as well as for parents and teachers.

References

- 1 Перепелюкова Е.В. Мониторинг функционального состояния и физической подготовленности студенток специальной медицинской группы / Е.В. Перепелюкова // Теория и практика физической культуры. — 2018. — № 3. — С. 41–43.
- 2 Николаев В.Т. Биоимпедансометрия как метод оценки соматического здоровья студентов в учебном процессе по физической культуре / В.Т. Николаев. Физическое воспитание и студенческий спорт глазами студентов: Материалы Всеросс. науч.-практ. конф. (6–8 ноября 2015 г.). — Казань: КНИТУ-КАИ, 2015. — С. 444–446.
- 3 Амлаев К.Р. Гиподинамия: как переломить ситуацию. Современные рекомендации по планированию физической активности (обзор) / К.Р. Амлаев, С.М. Койчуева, А.А. Койчугев, Е.Ю. Хорошилова // Изв. Самар. научн. центра РАН. — 2012. — Т.14, № 5 (2). — С. 518–521.
- 4 Гришан М.А. Физиологические последствия гиподинамии для организма человека / М.А. Гришан // Здоровье и образование в XXI веке. — 2018. — Т.20, № 12. — С. 70–73.
- 5 Кардозу В.М. Гиподинамия — болезнь цивилизации / В.М. Кардозу, Д.М. Фернандеш, А.Е. Бакытжанова // Бюлл. мед. интернет-конф. — 2014. — № 5. — С. 704.
- 6 Даутова М.Б. Влияние гиподинамии на жизнь человека / М.Б. Даутова, Г.Д. Жетписбаева, З.С. Абишева, Г.К. Асан, М.С. Журунова, Т.К. Раисов и другие // Междунар. журн. прикл. и фундамент. исслед. — 2016. — № 1–4. — С. 542, 543.
- 7 Кияева Е.В. Оценка функционального состояния и адаптационного потенциала студентов различных социальных групп / Е.В. Кияева, И.Э. Алиджанова, С.С. Акимов // Современные проблемы науки и образования. — 2014. — № 6. — С. 984.
- 8 Борисова Т.С. Основы гигиены детей и подростков: учеб. пос. / Т.С. Борисова, Н.В. Бобок, М.М. Солтан, Ж.П. Лабодаева. — Минск: Новое знание, 2018. — 390 с.
- 9 Ortiz, P.M.T., Chairez, S.J., Montano, F.E.M., & Balderas, L.G.L. (2012). Relation between the physical activity and obesity in schoolchildren. *Revista Cubana de Medicina General Integral*, 28(1), 34–41.
- 10 Chalikavada, R., Broder, J.C., O'Hara, R.L., Xue, W., & Gasevic, D. (2021). The association between neighbourhood walkability and after-school physical activity in Australian schoolchildren. *Health Promotion Journal of Australia*, 32(2), 182–188.
- 11 Abdelouhab, A., & Zabchi, N.Z. (2017). Lifestyle and its relationship with weight gain and obesity prevalence among high school students. *Neurology*, 12, 189–198.
- 12 Русина В.В. Проблема гиподинамии детей и подростков в современных образовательных условиях / В.В. Русина, Н.А. Радько, Е.В. Волох // Современные аспекты здоровьесбережения: материалы юбил. науч.-практ. конф. (23–24 мая 2019 г.). — Минск: БГМУ, 2019. — С. 96–98.
- 13 Бортановский В.Н. Оценка и прогнозирование уровня здоровья учащейся молодежи с позиции теории адаптации / В.Н. Бортановский, А.В. Золотарева // Проблемы здоровья и экологии. — 2004. — № 2. — С. 116–120.

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Мектепте оқушылар арасында гиподинамияның дамуын анықтау

Мақалада мектепте оқушылар арасында гиподинамияның туындау дәрежелерін анықтау жолдары қарастырылған және оның белгілерін анықтау әдістемесі ұсынылған. Сауалнама нәтижелерін талдағаннан кейін оқушылар арасында гиподинамия қауіпі бар топтар анықталды. Алдағы уақытта осы топтардың физиологиялық жағдайын анықтауға болады. Сауалнама нәтижелерін талдау барысында оқушылардың жартысынан көбі бос уақытында белсенді емес демалыс түрін қалайтыны белгілі болды. Физикалық белсенділіктің болмауына байланысты тәбеттің жоғарылауы семіздікке, содан кейін дене салмағының артуына және жаттығуларға кедергі келтіреді. Қозғалыс белсенділігінің төмендеуіне, ми тамырларының зақымдалуына байланысты гипоксияның пайда болуы адамның жадының нашарлауына ықпал етуі мүмкін, ақыл-ой қабілетінің төмендеуіне, неврозға әкелетін ауытқуларды тудырады. Физикалық белсенділіктің белгілері — әлсіздік, ұйқының бұзылуы, бас ауруы және артық салмақ. Сауалнама нәтижелерін талдау көрсеткендей, әр оныншы оқушы тек танертенгілік жаттығулар жасайды, төрттен бір бөлігі спорт секцияларына қатысады, сонымен қатар оқушылардың физикалық белсенділігін шектейтін маңызды фактор — бұл оқу процесі көптеген іс-шаралармен жүреді. Жоғарыда аталған қимыл-қозғалысы белгілерінің болмауы оқушылардың жартысына жуығына, ал «артық салмақ мәселесі» ширек бөлігіне тән. Мұның бәрі жеткіліксіз физикалық белсенділіктің ауыр салдарының дамуына әкелуі мүмкін.

Кілт сөздер: мектеп, ғылыми-зерттеу жұмысы, гиподинамия, физиологиялық жағдай, гигиена, табиғи қозғалыс, артық салмақ, спорт, бұлшықет, атрофия.

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Определение развития гиподинамии среди школьников

В статье предложена методика определения признаков гиподинамии. Проанализировав результаты анкетирования, были выявлены группы риска гиподинамии среди учащихся. В дальнейшем можно определить физиологическое состояние этих групп. В процессе анализа результатов анкетирования выяснилось, что более половины учащихся предпочитают неактивную форму отдыха в свободное время. Из-за отсутствия физической активности повышенный аппетит приводит к ожирению, а затем к увеличению массы тела и мешает тренировкам. Возникновение гипоксии из-за снижения двигательной активности, повреждения сосудов головного мозга может способствовать ухудшению памяти человека, провоцировать отклонения, приводящие к снижению умственных способностей, неврозам. Признаками физической активности являются слабость, нарушения сна, головные боли и избыточный вес. Анализ результатов анкетирования показал, что только каждый десятый студент регулярно делает утренние тренировки, четверть посещает спортивные секции, а также важным фактором, ограничивающим физическую активность учеников, является то, что учебный процесс происходит при значительном количестве видов деятельности. Отсутствие перечисленных выше признаков гипокнезии характерно для половины учащихся, «проблемы с лишним весом» — для четверти. Все это может привести к развитию более серьезных последствий недостаточной физической активности.

Ключевые слова: школа, гиподинамия, физиологическое состояние, гигиена, естественное движение, лишний вес, спорт, мышца, атрофия.

References

1. Perepeliukova, E.V. (2018). Monitoring funktsionalnogo sostoiianiia i fizicheskoi podgotovlennosti studentok spetsialnoi meditsinskoi gruppy [Monitoring of the functional state and physical fitness of female students of a special medical group]. *Teoriia i praktika fizicheskoi kultury — Theory and practice of physical culture*, 3, 41–43 [in Russian].
2. Nikolaev, V.T. (2015). Bioimpedansometriia kak metod otsenki somaticheskogo zdorovia studentov v uchebnom protsesse po fizicheskoi kulture [Bioelectrical impedance measurement as a method of assessing students' somatic health in the educational process of physical culture]. Proceedings from Physical education and student sports through the eyes of students '15: *Vserossiiskaia nauchno-prakticheskaia konferentsiia (6–8 noiabria 2015 goda) — All-Russian Scientific and Practical Conference*. Kazan: KNITU-KAI, 444–446 [in Russian].
3. Amlaev, K.R. Koichueva, S.M., Koichuev, A.A., & Khoroshilova, E.Yu. (2012). Gipodinamiia: kak perelomit situatsiiu. Sovremennye rekomendatsii po planirovaniu fizicheskoi aktivnosti (obzor) [Physical inactivity: how to reverse the situation. Modern

recommendations for planning physical activity (review)]. *Izvestiia Samarskogo nauchnogo tsentra Rossiiskoi akademii nauk — Proceedings of the Samara Scientific Center of the Russian Academy of Sciences*, 14, 5(2), 518–521 [in Russian].

4 Grishan, M.A. (2018). Fiziologicheskie posledstviia gipodinamii dlia organizma cheloveka [Physiological consequences of physical inactivity for the human body]. *Zdorove i obrazovanie v XXI veke — Health and education in the XXI century*, 20, 12, 70–73 [in Russian].

5 Kardozu, V.M., Fernandesh, D.M., & Bakytzhanova, A.E. (2014). Gipodinamiiia — bolezni tsivilizatsii [Hypodynamia is a disease of civilization]. *Biulleten meditsinskikh internet-konferentsii — Bulletin of Medical Internet Conferences*, 5, 704 [in Russian].

6 Dautova, M.B., Zhetpisbaeva, G.D., Abisheva, Z.S., Asan, G.K., Zhurunova, M.S., & Raisov, T.K., et. al. (2016). Vliianie gipodinamii na zhizn cheloveka [The effect of hypodynamia on a human's life]. *Mezhdunarodnyi zhurnal prikladnykh i fundamentalnykh issledovaniy — International Journal of Applied and Fundamental Research*, 1–4, 542, 543 [in Russian].

7 Kiiaeva, E.V., Alidzhanova, I.E., & Akimov, S.S. (2014). Otsenka funktsionalnogo sostoiianiia i adaptatsionnogo potentsiala studentov razlichnykh sotsialnykh grupp [Assessment of the functional state and adaptive potential of students of various social groups]. *Sovremennye problemy nauki i obrazovaniia — Modern problems of science and education*, 6, 984 [in Russian].

8 Borisova, T.S., Bobok, N.V., Soltan M.M., & Labodaeva, Zh.P. (2018). *Osnovy gigieny detei i podrostkov: uchebnoe posobie [Basics of hygiene of children and adolescents: textbook]*. Minsk: Novoe znanie [in Russian].

9 Ortiz, P.M.T., Chairez, S.J., Montano, F.E.M., & Balderas, L.G.L. (2012). Relation between the physical activity and obesity in schoolchildren. *Revista Cubana de Medicina General Integral*, 28(1), 34–41.

10 Chalikavada, R., Broder, J.C., O'Hara, R.L., Xue, W., & Gasevic, D. (2021). The association between neighbourhood walkability and after-school physical activity in Australian schoolchildren. *Health Promotion Journal of Australia*, 32(2), 182–188.

11 Abdelouhab, A., & Zabchi, N.Z. (2017). Lifestyle and its relationship with weight gain and obesity prevalence among high school students. *Neurology*, 12, 189–198.

12 Rusina, V.V., Radko, N.A., & Volokh, E.V. (2019). Problema gipodinamii detei i podrostkov v sovremennykh obrazovatelnykh usloviakh [The problem of physical inactivity of children and adolescents in modern educational conditions]. Proceedings from Modern aspects of health-saving '19: *Yubileinaia nauchno-prakticheskaiia konferentsiia (23–24 maia 2019 goda) — Anniversary Scientific and Practical Conference*. (pp. 96–98). Minsk: Belarusian State Medical University [in Russian].

13 Bortanovskii, V.N., & Zolotareva, A.V. (2004). Otsenka i prognozirovanie urovnia zdorovia uchashcheisia molodezhi s pozitsii teorii adaptatsii [Assessment and prediction of the health level of students from the perspective of adaptation theory]. *Problemy zdorovia i ekologii — Health and environmental issues*, 2, 116–120 [in Russian].