

HYGIENIC ASSESSMENT OF DAILY DIETARY INTAKE OF MEDICAL STUDENTS

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It is difficult to overestimate the relevance of the study of the actual nutrition of students of higher education institutions, as nutrition is the most important component of healthy lifestyle. The aim of the study was to perform hygienic assessment of the medical university students' daily dietary intake. The study involved 1200 students of the 1st, 2nd and 3rd years at the department of general medicine, pediatric department and dental department. The method of studying actual nutrition with the help of an electronic food diary, where the subjects entered information about the foods consumed during the day, was chosen to record actual nutrition facts. Data processing showed that the daily nutritional intake of students at all the studied faculties was characterized by reduced caloric content, reduced intake of nutritional substances, lack of systematization of meals and eating mainly in the evening. Thus, hygienic assessment of the medical students' daily dietary intake revealed shortcomings in the organization of nutrition of this population group, which should be eliminated in order to preserve and improve the health of future specialists. In subsequent studies, one would need to assess the nutrition of different gender groups in order to trace the emerging nutritional stereotypes in groups of young men and women, taking into account the differences in age and the chosen specialty.

Keywords: student nutrition, actual nutrition, diet analysis, dietary habits, nutritional pathology, preventive measures, healthy nutrition

Author contribution: Makarova IO — conducting experiments and collecting data/evidence, analyzing and interpreting the data obtained; taking responsibility for all aspects of the paper, the integrity of all parts of the paper and its final version; applying statistical, mathematical, computational or other formal methods to analyze and synthesize research data.

Compliance with ethical standards: the study was approved by the Ethics Committee of the Burdenko Voronezh State Medical University (protocol № 7 dated 8 November 2021). All study participants submitted the informed consent to personal data processing.

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ГИГИЕНИЧЕСКАЯ ОЦЕНКА СУТОЧНОГО РАЦИОНА ПИТАНИЯ СТУДЕНТОВ МЕДИЦИНСКОГО ВУЗА

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Актуальность исследования фактического питания учащихся высших учебных заведений сложно переоценить, так как питание является наиболее важной составляющей здорового образа жизни. Целью исследования было выполнить гигиеническую оценку суточного рациона питания студентов медицинского университета. В исследовании приняли участие 1200 учащихся 1–3 курсов лечебного, педиатрического и стоматологического факультетов. Для регистрации суточного рациона был выбран метод изучения фактического питания с помощью электронного дневника питания, где испытуемые вносили информацию об употребленных за день продуктах. При обработке данных было установлено, что для суточного рациона обучающихся всех исследуемых факультетов характерны пониженная калорийность, снижение употребления пищевых веществ, отсутствие систематизации приемов пищи и питание преимущественно в вечерние часы. Таким образом, гигиеническая оценка суточного рациона питания студентов медицинского вуза определила недостатки в организации питания исследуемого контингента, которые необходимо устранить в целях сохранения и укрепления здоровья будущих специалистов. В ходе дальнейших исследований необходимо оценить питание различных гендерных групп, чтобы получить возможность проследить формирующиеся стереотипы питания в группах юношей и девушек с учетом разницы в возрасте и выбранной специализации.

Ключевые слова: питание студентов, фактическое питание, анализ рациона, пищевые привычки, алиментарная патология, профилактические мероприятия, здоровое питание

Вклад авторов: И. О. Макарова — проведение экспериментов и сбор данных/доказательств, анализ и интерпретация полученных данных, принятие ответственности за все аспекты работы, целостность всех частей статьи и ее окончательный вариант, применение статистических, математических, вычислительных или других формальных методов для анализа и синтеза данных исследования.

Соблюдение этических стандартов: исследование одобрено этическим комитетом Воронежского государственного медицинского университета имени Н. Н. Бурденко (протокол № 7 от 8 ноября 2021 г.). Все участники исследования подписали согласие на обработку персональных данных.

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Studentship is a social phenomenon that is of great scientific interest due to its particularism. This phase is rather important for humans both in social terms and in terms of the body systems' development completion. In this regard, the issue of nutrition during this period becomes especially important, since among other lifestyle factors it is nutrition that has the most significant impact on health. Therefore, nutrition comes to the foreground among other factors of healthy lifestyle, as evidenced by a huge body of scientific literature [1–4].

Today, nutrition is a rather pressing issue, which suggests high public interest in healthy lifestyle. However, this problem is often given very little attention in the student environment [5].

This is largely due to heavy workload at classes, a lot of tutorials to master when preparing for classes, and the lack of time. If we talk about medical students, then, due to the educational process specifics, they have even less free time, which invariably affects their lifestyle and later their health status [6].

In addition, for a number of reasons, certain food groups are unavailable to students, which means that students do not get enough useful nutrients. This leads to a decline in general health, problems in mastering educational material, as well as the increased risk of developing nutrient-dependent pathology, which, according to statistical studies, is a quite common problem in modern society.

Table 1. Number of participants

	Boys	Girls
Department of General Medicine		
Year 1	46	98
Year 2	35	94
Year 3	14	115
Pediatric Department		
Year 1	25	113
Year 2	15	115
Year 3	13	123
Dental Department		
Year 1	34	103
Year 2	41	93
Year 3	26	97

At the moment, there are quite a lot of scientific works focused on the issue of nutrition in the context of the emergence of nutritional diseases or lifestyle in general, including assessment of the higher school students' nutrition [7, 8]. Nevertheless, there are not enough large-scale studies focused on the issues related to student nutrition and their rationale.

The study was aimed to perform hygienic assessment of the daily food intake of medical university students to provide a potential basis for justification of possible non-compliance with the established standards and for completion of the list of most efficient preventive measures to avoid the development of disorders associated with nutrition in students.

METHODS

The study involved 1200 students of VSMU (951 girls and 249 boys) from among the 1st, the 2nd and the 3rd year students. The number of students from each department is shown in Table 1.

The age of the participants was 18-21 years (average age 19.1 ± 0.9 years). To identify possible differences in dietary intake in students of different training profiles, students from three different departments — general medicine, pediatric and dental — were selected. The study was conducted September 2021 to May 2023 on the basis of the VSMU sports and recreational complex. The type of the study was cross-sectional. The method chosen to record actual nutrition was based on an electronic food diary, Diet 5.0 (Istoki Zdorovya; Russia), designed to quantify a person's nutrition based on objective interviews with the client. This software is designed to generate diets corresponding to the individual nutrient norm of the patient. The norm is set automatically taking into account optimization goals, anthropometric data, psychological loads, physical activity, and in some cases, data on the subject's chronic diseases and conditions are also used.

During the study, anthropometric data acquired were recorded in the electronic diary, the main parameters of the participants were identified, and minimum calorie intake required for restoration of energy expenditures was calculated. After that participants had to record all foods consumed during the day for three days in order to create a personal complete diet. Then, considering the data obtained, a profile was created, in which the surveyed individuals entered information about all the meals consumed during the day (breakfast, morning snack, lunch, afternoon snack, dinner, evening snack) and their time (8:30, 11:00, 13:30, 16:00, 19:00, 21:00) using the method of 24 h nutrition recording. Software automatically calculated the

calorie intake and the ratio of macronutrients in the consumed foods based on this profile.

The data obtained were statistically processed using the MS Office Excel 2016 software package (Microsoft; USA). Methods of statistical analysis and descriptive statistics were applied including data presented as arithmetic mean (M) and standard deviation (σ), with some data presented as percentages.

RESULTS

When processing the data, the following results were obtained: the average total caloric content of the diet of students of the first three courses at three studied faculties was 1320 kcal, of which breakfast was 267.8 kcal (20.3%), morning snack was 65.3 kcal (5%), lunch was 447 kcal (33.9%), afternoon snack was 69 kcal (5.2%), dinner was 509 kcal (38.6%), and evening snack was 57.8 kcal (4.4%).

When calculating the content of macronutrients in the diet, it was found that the basis of the diet were carbohydrates — 159 g (58%), fat held the second place in the macronutrient composition of the diet — 66 g (24%), while the content of proteins was reduced — 50 g (18%) (Fig. 1, 2).

The study conducted has shown that the energy value and amounts of nutritional substances consumed by students were significantly lower compared to the standard values (Table 2).

When analyzing student diets, the following features were revealed. First, breakfast is the least caloric meal, which is observed in all departments, while dinner, on the contrary, is the most high-calorie meal. Second, there is some heterogeneity

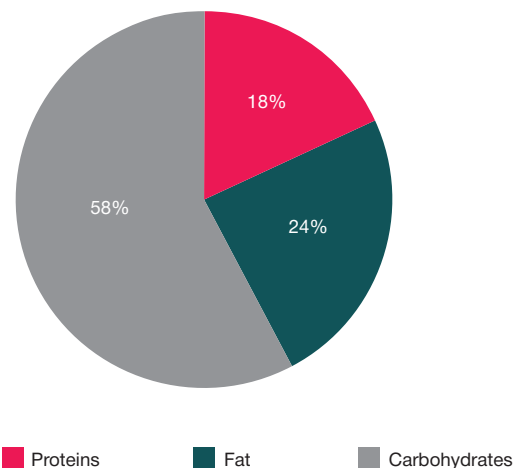


Fig. 1. Macronutrient composition of the diet (%)

Table 2. Students' daily intake of nutritional substances and energy consumption

	Year 1	Year 2	Year 3
Proteins, g/day	46.4 ± 1	51.2 ± 0.9	53 ± 1
Fat, g/day	65.5 ± 2.4	68 ± 1.3	67 ± 2.4
Carbohydrates, g/day	152 ± 2.9	167 ± 4.5	158 ± 4.6
Energy value, kcal	1281 ± 26	1388 ± 23	1294 ± 22

in the results obtained, as a strong variation in the caloric content of the diet was found in students of pediatric and dental departments (Fig. 2–4).

The results obtained can be generally characterized as follows:

- reduced caloric content of the diet;
- insufficient consumption of all groups of nutritional substances by students;
- meals taken at random;
- eating mainly in the evening hours.

DISCUSSION

The study has made it possible to identify some features of the medical university students' nutrition, trace the trends of diet formation and reveal the major shortcomings of actual students' diet on the example of three primary academic years.

According to methodical recommendations MP 2.3.1.0253-21 "Standard rates of physiological demand for energy and food substances in different population groups of the Russian Federation", the indicators of the students' diet macronutrient composition deviate from the established standards for adults.

The findings suggest that medical university students definitely have a calorie deficit, since the daily calorie intake for their age (18–29 years) and 1st labor class is 2150 kcal for males and 1700 kcal for females.

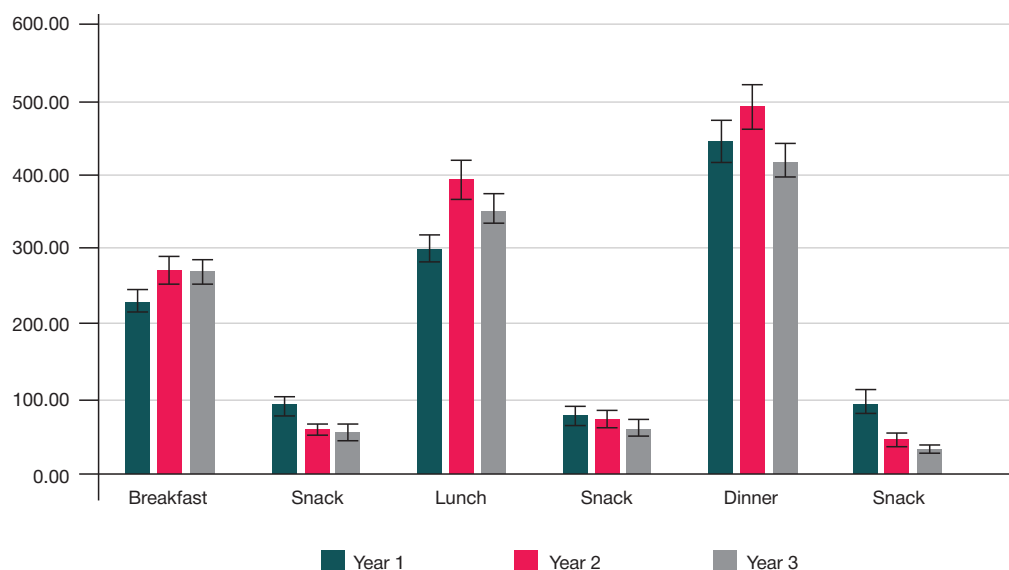
The analysis of the diet caloric content in the studied groups showed that students at the department of general medicine had the lowest total caloric content of the diet. It was 1390 kcal, while the caloric content of the diet of students of pediatric faculty was 1539 kcal and that of dental students was 1432 kcal. Therefore, the caloric content of lunch and dinner consumed by students at the department of general medicine is the lowest among the studied faculty, while the lowest caloric content of breakfast has been revealed in students of the faculty of dentistry (263 kcal).

The maximum calorie intake of students falls on evening hours, while the caloric content of morning meals is reduced, which means that the structure and frequency of meals are impaired. This is a risk factor for many nutritional disorders [9]. Furthermore, this indicates that students do not have enough time to eat in the morning and at lunch because of early rising and heavy workload in classes, which contributes to the development of emotional stress and related consequences, such as emerging disorders associated with the nervous system.

This disruption of meal patterns can affect both students' performance, as low nutrient intake in the morning prevents the body from utilizing its resources and paving the way to cognitive decline throughout the day, poorer general well-being, as morning nutrient intake ensures that metabolic processes are at sufficiently high level throughout the day.

Moreover, insufficient macronutrient consumption by students has been revealed during the study. Thus, analysis of the diets presented has shown that the students' overall fat intake is 66 g, which represents the lower limit of normal fat intake for adults. Fat consumption is related to the nervous system activity, so why we can conclude that the medical university students, who have high cognitive load in classes and experience emotional stress when preparing for exams and tests, leave this system of the body without proper support. This situation adversely affects general health and the students' progress in mastering the profession [10].

Furthermore, insufficient carbohydrate content was revealed in the students' daily diet, since total daily carbohydrate intake is 159 g, which is well below the established standard (250–500 g). However, one should not forget that carbohydrates form the basis of the diet and play the role of energy source in the body [11–13]. Thus, already at the stage of assessing the macronutrient composition of the students' diet, it can be concluded that the diet is unbalanced and correction of the diet requires organization of preventive work in the educational institution.

**Fig. 2.** Caloric content of the main meals of students of the Department of General Medicine (kcal)

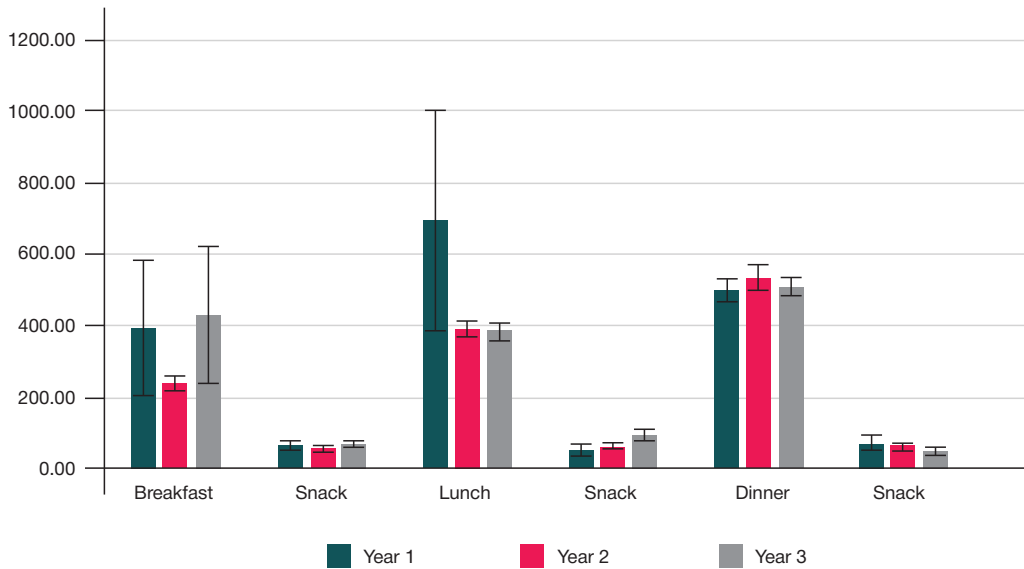


Fig. 3. Caloric content of the main meals of students of Pediatric Department (kcal)

The analysis of the diets also revealed a lack of protein intake by the students. The total daily protein intake is 50 g, which, given that the normal range is 60–100 g, represents a significant deficit. This factor can provoke a number of pathological conditions even with a short duration of exposure. Insufficient protein intake results in anemia, with which a great number of diseases of organs and organ systems are associated. For this reason, insufficient intake of products containing protein is extremely dangerous at any stage of body development, let alone an organism that is at the final stage of development. Insufficient intake of protein with food in students is usually associated with a limited budget, as well as lack of time to prepare meals from protein-containing products [14, 15].

The findings indicate that a comprehensive approach to dealing with the problem of nutrition of students of higher education institutions is needed. Evaluation of the data obtained revealed the main shortcomings of the existing nutrition system. It was found that overcoming this situation requires both work with students themselves to organize nutrition and healthy lifestyle, and certain changes in the structure of the educational institution.

CONCLUSIONS

The study of the medical university students' nutrition revealed some discrepancies between their actual nutrition and the established principles of healthy lifestyle. First, analysis of the diets of the medical university students at all the studied faculties revealed a downward trend in the calorie intake: given the normal caloric content range is 1700–2150 kcal, the total caloric content for three faculties is 1320 kcal. Such situation can, in turn, be the risk factor of disorders associated with heavy workload in classes, emotional stress and accelerated pace of life. Second, frequency of meals is impaired at all faculties. Given high caloric content of dinner, breakfast is the lowest calorie meal, which means that young adults consume food mostly in the evening, which can result in digestive problems and early onset nutritional disorders. Third, assessment of the diet macronutrient composition has shown that nutrition is imbalanced. Thus, hygienic assessment of the medical university students' daily food intake revealed shortcomings in the nutrition setup of this population group, which should be eliminated in order to preserve and improve the health of future professionals through introduction of

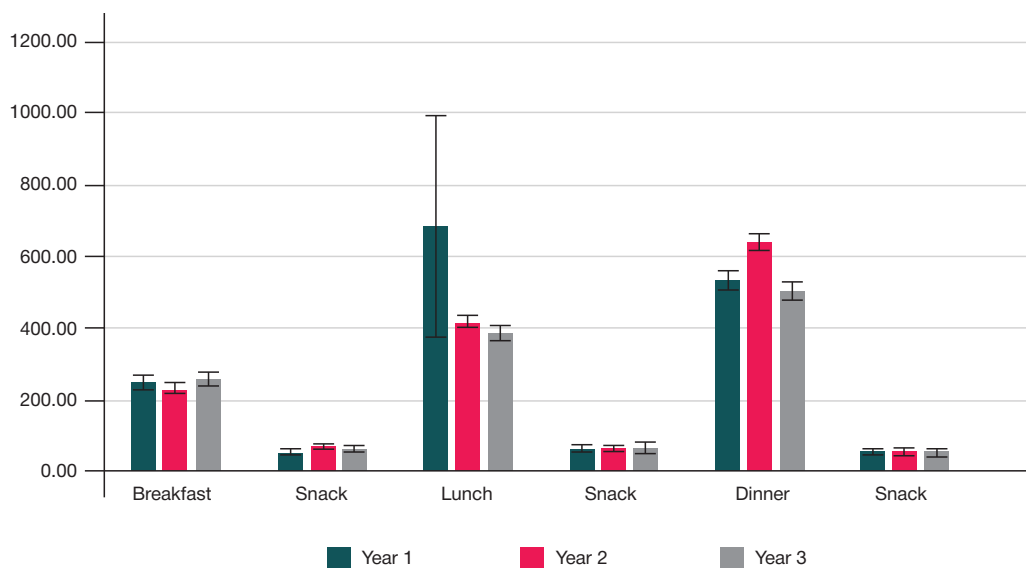


Fig. 4. Caloric content of the main meals of students of Dental Department (kcal)

preventive measures focused on healthy nutrition in the higher education system. In the future studies it is necessary to assess nutrition of different gender groups in order to trace the

emerging nutritional stereotypes in groups of young men and women, considering the differences in age and the chosen speciality.

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